* John Clarke. 1776.

Compendium Belli:

OR THE

TOVCHSTONE OF MARTIALL DISCIPLINE.

VVherein is set foorth briefe rules and Directions to take speciall notice of.

*The next of Marches, Exercising of a Com-*pany, ordering of Muskaters, Imbattelling from 100. vnto 40000.

The forme of Encamping, with briefe Notes belonging therevnto: Plots of Fortifications and Forts: With the manner of Lading and blowing off *Great Ordnance, making of Granados.*

Also shewing the Extraction of the square Roote, with a Table from 16. vnto 10000. Likewise certaine Questions of Arithmaticke concerning Millitary Diseipline: With a Table also for the discouering of numbers by Rancke and File.

Virtus gloriam paret.

Witten by IOHN ROBERTS of Weston neere *Bath*, Gent.

London printed by *I. Norton* and *A. Mathewes.* 1626.

TO THE RIGHT HONOURABLE WILLIAM Earle of *Pembrooke*, Lord *Herbert* of Cardiffe, Lo: *Parre* and *Rosse* of Kendall, Lo: *Marmion* and St. *Quintin*: Lord Warden of the *Staneries* in the County of Deuon and Cornewall, of the most Noble *Order of the Garter, Knight*: *Chancellor of the V*-niuersity of Oxford, and Captaine of the Kings Maiesties Towne and Castle of Portsmouth, and the Iland of Portsey, Lo: Chamberlaine to his Maiestie, and one of the Lords of his Maiesties most honorable Priuy Councell,

RIGHT HONORABLE:

Eing filled with a studious obseruation of your noble parts, and a declaratory fame of the Vertues and Heroicke actions *of your Fame-worthy Progeni-*

Progenitors, and thoſe tranſ-mitted vnto You by a ſucceſsiue Lineall *and* Hereditary *right: ſo that that rare Coniunction of* Caſtor *and* Pollux, *Imeane,* Nobilitas, & Ortu, & Arte, *are both happily conioyned in your noble Perſon. The Curious ſuruey of the multitude of your Honourable parts bred in me a number of deſires: ſo that I haue aduentured to breake the barren ſoyle of my vnluckie Portion, that proſperous ſucceſſe ſhould rather want to my endeauours, then diligent endeauours to my loyall determination. My ſubmiſsiue reſpect to your noble and Heroicke Vertues haue bin a preſumptatiue cauſe to deſire your Lordſhips gratious Patronage of this my* Compendium Belli, *but how my vnworthineſſe*

thyneſſe may hope of your Goodnes, I cannot finde but in the notes of your tranſcendent and generous diſpoſition. Thus in the loweſt humility of affection, I offer both my ſelfe, and the Imployment of my vndeſeruing ſeruice, freely to your Honors acceptance: and doe deſire both to be, and to appeare to be

Your Honors humbleſt

and moſt devoted Seruant

IOHN ROBERTS.

To all Gentlemen and Louers of the Art of Warre.

NOble and ingenious Reader, I haue preſented to the world, and to thy viewe this *Compendium*, that thou with it mayeſt reape, that only, by thy intuitiue ſpeculation, which I haue got by my laborious practiſe: I make no doubt of thy skill and knowledge herein, but that thou knoweſt, and haſt ſeen, this in thine owne practicke, by thy induſtrious trauell; Which now thou ſeeſt here in the Theoricke, by my laborious paines. Therefore I deſire your courteous cenſure in the peruſall of this Booke: for if any thing be miſtaken through equiuocation of words, or ambiguitie of ſenſe, blame the fruitleſſe rage of Deſtiny, that carries the beſt ſhafts of my vnlucky Quiuer farr diſtant from the white I aymed at. I did it

for

for the honour of my Countrey, and the generall good of the common weale: for which reasons, I hope it may passe without the molestation of any of the vnskilfull: The Learned and Ingenious I honor, and willingly stand to their censure: To the rest

Farewell.

Compendium Belli:

OR

THE TOVCHSTONE of Martiall Diſcipline.

Principall and eſpeciall Rules for euery Commaunder to be perfect in.

THoſe things that helpeth the Enemie greatly, annoyeth thee, and the ſame that helpeth thee, hurteth him.

Hee that is more carefull and vigelant, to obſerue the cunning and polliticke deuiſes of the Enemy, and alſo taketh moſt paines in the exerciſing his Company, or Army, ſhall be ſure to incurre leaſt perills, and may haue greateſt hope of victorie.

Neuer enterprise any dangerous incounter with thy Souldiers, but first by thy pollicie, let there be giuen out, hope of victorie.

It is better to conq er the Enemy with famine, then with the sword; in the victory of which, fortune may doe much more then valoure.

No plot or purpose is better then that which is hid from the Enemy, vntill it be executed.

To know in the warre how to vnderstand occasion, and take it, more auayleth then any thing.

Nature breedeth few strong and valient men, but industry and exercise maketh many.

Discipline may doe much more in time of battell, then furie.

If any of the Enemies Souldiers depart from them and fly to thee (so they prooue faythfull) they shall be allwaies vnto thee great gaines, and stand thee in great steede, for that the power of thy Enemies are thereby deminished, and much more weakened, then of those that be slaine, though the name of a Fugitiue be to old frinds odious, to new suspected.

Better it is in pitching the field, to reserue behinde the first front ayde enough, then to make a big front, which will doe great hurt, and disperse the Companies.

He is difficultly ouercome, which knoweth his owne strength, and the power of his enemies.

The valour of the Souldiers, more auaileth then the multitude.

Some-

Sometimes the ſituation helpeth more then valour.

New & ſodaine thinges make Armies affraide; ſlowe and accuſtomed things be little regarded: Therefore make thy Armie practiſe; and know, with ſmall fightes a new enemy, before thou aduenterest to fight a field with them.

He that with diſorder followeth the enemie after that their order is broken, will become of a Conquerour a Conquered.

He that prepareth not neceſſary victualls, with all manner of Amunition, is ouercome without the Sword.

He that truſteth more in Foote-men then Horſemen, or in Horſe-men more then in Foote-men, muſt accomodate himſelfe with the ſituation.

When thou wouldſt ſee if in the day there be come any Spie into the Campe, make proclamation that euery man goe to his lodging, ſo ſhall you know your owne men from ſtrangers.

Change purpoſe if thou perceiueſt that thy enemie hath foreſeene it.

Conſult with many aboute the thinges thou oughteſt to doe, the ſame thou wilt after doe, conferre with few.

Souldiers when they abide at home, are mainteyned with feare and puniſhment; after, when they are led to the warre, with hope and rewarde.

Be ſure the enemie know not how thou wilt order thy Army in battell; and whatſoeuer man-

ner sets the battell, make that the first Bande be receiued off first and second.

In fight neuer occupie the battell to any other thing then to the same for which thou hast appointed it, if thou meanest to make no disorder.

Suddaine accidents are remedyed with difficulty, those that are thought vpon with facility.

Before thou bringest thy Souldiers to giue battell, cause them to be ranged in forme of battell, making of his Foote-men sundry Battalions, and of those sundry fronts; to deuide the Horse-men also in sundry troopes, placing the Lances, Light-horsemen, and Hargubusiers, euery front in seuerall troupes by themselues, to cause the forlorne to issue out, and skirmish them before the battalions, as if the enemy were indeed present, and vpon a retreate sounded and beaten, suddenly to retire: The Horse-men to charge, and suddenly to returne againe into their place; vpon their retreate to cause certaine sleeues of Pikes, and light armed, to runne out to their reskew, as though the enemie did pursue them: Then the Battalions of the first front to march forward, and charge the enemie, and suddenly after the sound of the retreate, to retire themselues orderly, betweene the Battalions of the second front: Then the second front must charge, and march forward together with the other that last retired, and make head together vpon the enemy.

Last of all, the light armed Foote-men and Horse-

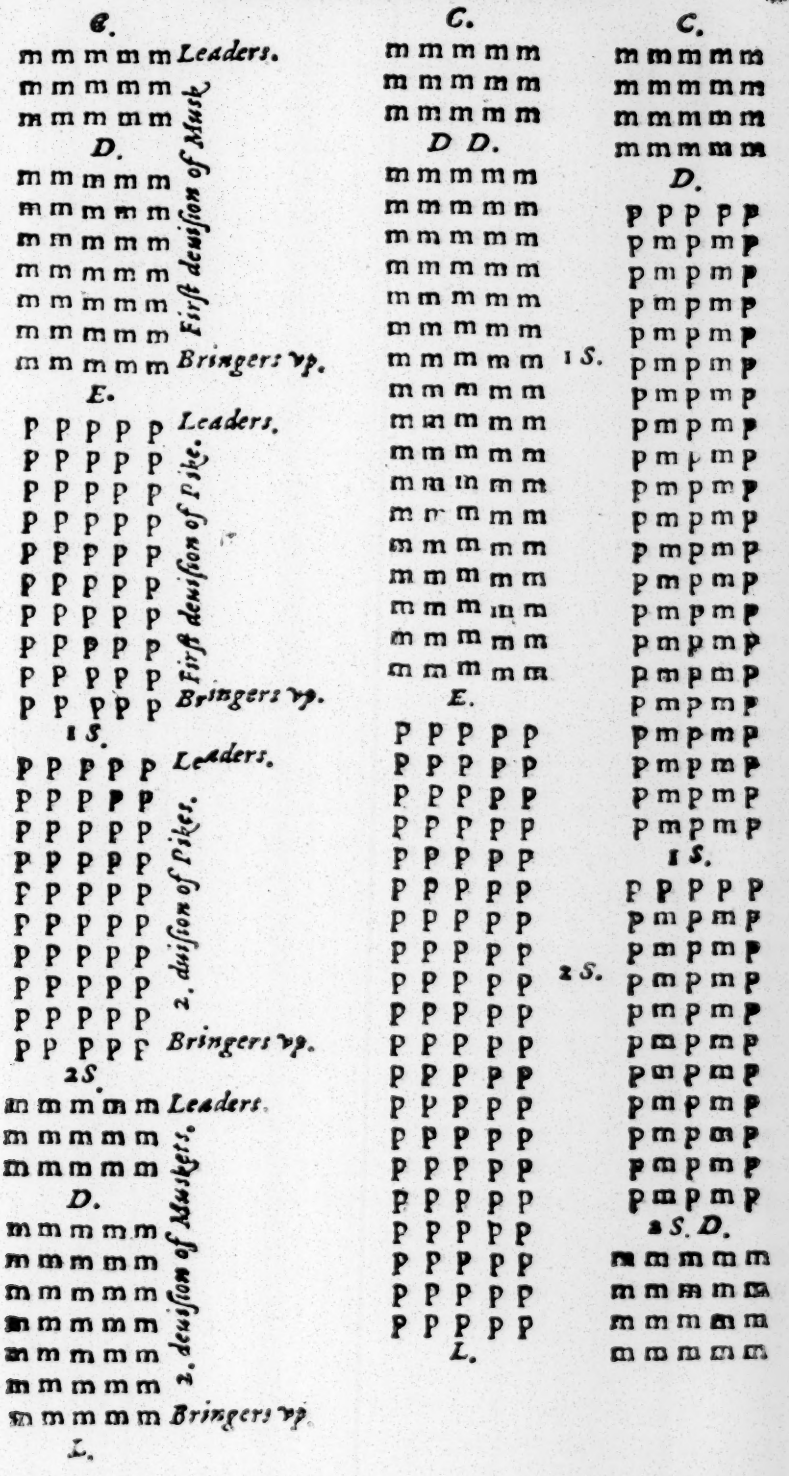
Horſe-men muſt iſſue out, as it were to doe execution vpon the enemie.

Whilſt fayre weather is, the Generall muſt acquaint the Souldiers to ſleepe vpon bare ground: Although the enemy be farre abſent, yet duely to mainteine the Skoutes, lay out their Pardues, ſet forth their Centryes, and performe all manner of Millitary Orders, as curiouſly and carefully as if the enemie were preſent: He muſt keepe his Souldiers in continuall exerciſe; and by feigned Allarums, to ſee in what readineſſe his Forces would be (if neceſſity required:) But if the enemie chance to cauſe any Allarum indeede, it is his pollicie then to cauſe the Campe to be in armes by the ſound only of the Drumbeſtickes, or ſome other priuate watch-word, or ſome Warning-peece, which when the enemie perceiues that the Campe is in Armes without any manner of Allarum, will much amaze and terrify them, to finde them in ſuch readineſſe, daſing them and their affronts.

Alſo, the Generall ought to ſhew them all manner of wayes how the enemie may attempt them, diſcouering alſo to them their remedy, and how they are to anſwere to thoſe attempts; for no Man is borne a Souldier, but by exerciſe and induſtry it is attayned, and by diſcontinuance againe it is loſt, as all other Artes and Sciences are.

You muſt haue a ſpeciall care, that the Army haue not in their faces the duſt to blinde them, the winde to diſturbe them, or the Sunne beames to annoy them, before they enter into any maine Encounter; the which Impediments, not only altogether, but each one by himſelfe alone, doth bring great toyle, trouble, and diſaduantage.

The


C.
Leaders.
First deuision of Musk.
D.
Bringers vp.
E.
Leaders.
First deuision of Pike.
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2 S.
Leaders.
2. deuision of Muskers.
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Bringers vp.
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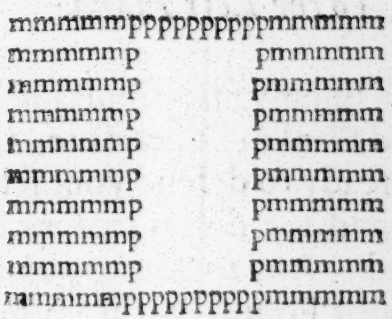
IF you meane to exerciſe a Company, you muſt bring them into this forme. *viz.* The Muskatiers muſt be placed on both ſides of the Pikes, fiue Files on one ſide, and fiue on the other, the Pikes ten deepe, and ſo many ſquare in the middle.

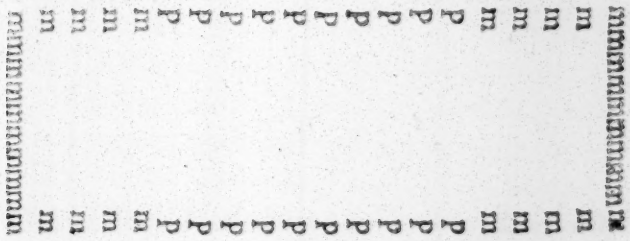
To your Right Hand.

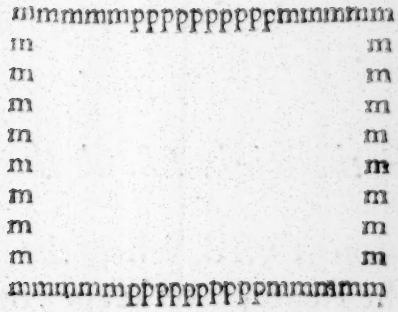
Firſt note, that before you begin to exerciſe the Company, you firſt commaund them to aduance their Pikes, and to ſhoulder their Muskets: Then you haue no more to doe, but to cauſe them to turne to their Right-hand, which is thus; They muſt not remooue their Left legge from the ground, but turue vpon it, and remooue only the Right, to make the Right hand File the Front, as you ſee in this Figure.

As you were.

As you turned to your Right, ſo in the ſame manner you muſt turne backe to your Left, keeping your Left legge ſtill vpon the ground, vntill you come euen with the Front.







To the Left Hand.

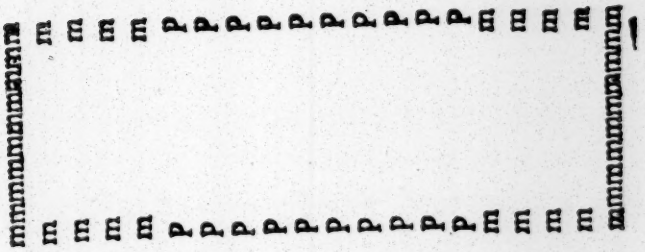
Becauſe the Enemy may ſometimes Charge on the Left Hand Flanke; Therefore, that you may be ſudainely ready to defend your ſelues, and offend them; and for diuers reaſons beſides, this Motion is vſed: And to doe it, you muſt mooue with your Right Foote, vntill your Faces front toward the Left Flanke, your Left Foote not mooving from the place where it ſtood before, but turning.

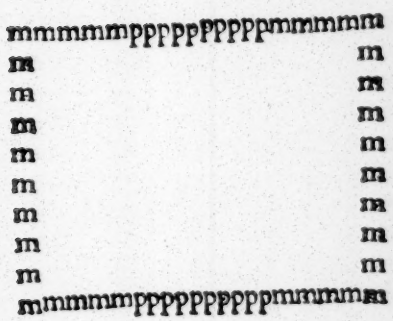
As you Were.

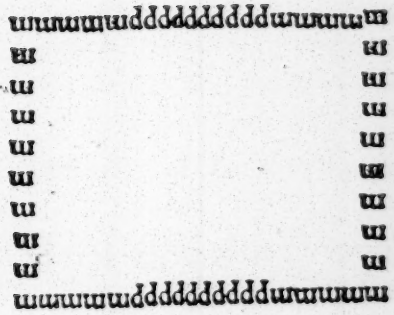
Then hauing performed the aforeſaid Motion, the Captaine commaunds, *As you weare*, and then they mooue all towards the Right Hand, vntill they are turned to the firſt Front, mooving vpon the ſame Foote you did before.

To the Right Hand About.

This Motion is vſed, when the Enemy doth Charge in the Reare; then keepe your Left Foote ſtill, and turne to the Reare, and Charge, or otherwiſe for exerciſe.







To the Left Hand as you were.

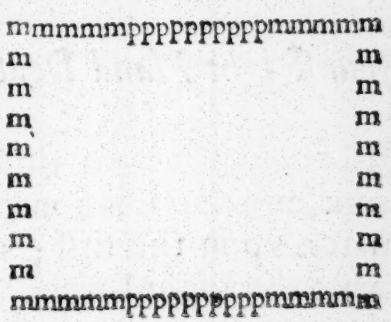
Hauing performed the former Motion, the Captaine commaunds them, To the Left hand as you were, the Left Foote remaines fixed, vntill their faces be turned to the former front.

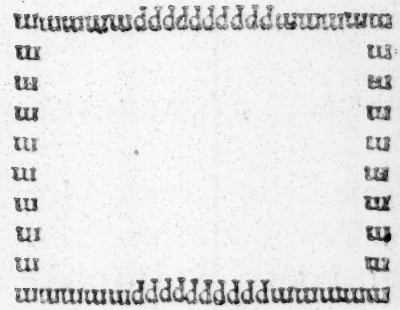
To the Left Hand about.

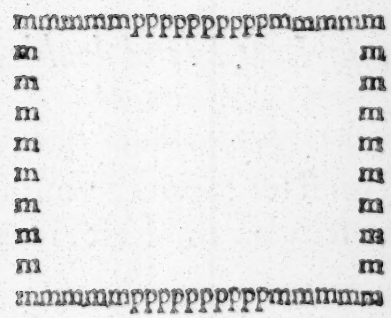
Sometimes it is more conuenient to turne to the Left Hand then to the Right, therefore this Motion is vſed, the Left Legge ſtill ſtanding.

To the Right hand as you were.

It is but turning towards your Right Hand, vntill you come to the former Front.







Rankes to your Right Hand Double.

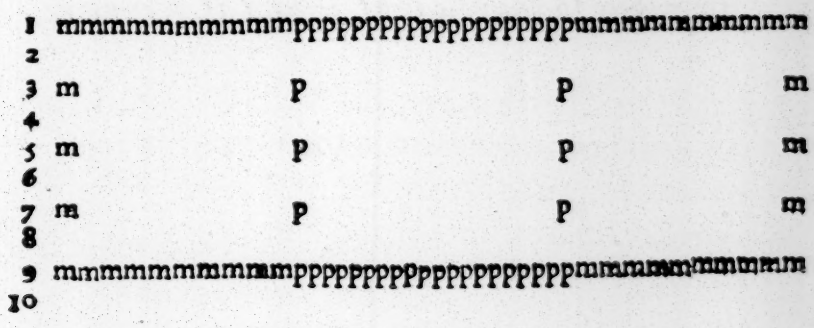
This Motion is onely vſed, to double and ſtrengthen the Front; and thus it is done, all in the ſecond Ranke, march vp in the firſt; and firſt, they muſt ſet forward the Right Legge, and then the Left, making but two Paces to the Front, and ſo the Fourth, the Sixth, the Eight, and Tenth Ranke, muſt likewiſe doe all at one inſtant.

Rankes to your Left Hand as you were.

Hauing performed the former Motion, you turne about at the Word of Commaund, and ſet forward your Left Foote, and ſo make two Paces, comming into your forme againe, all at one inſtant.

Rankes to your Left Hand double.

This is almoſt all one as you did with the Right, ſaue you muſt ſet forward your Left Leg firſt, and put your ſelfe on the Left Hand of your Leader.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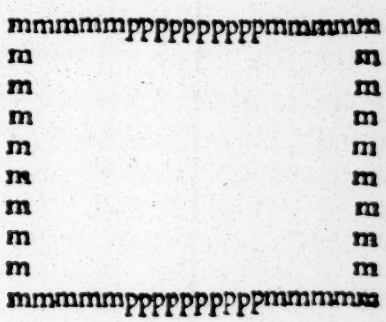
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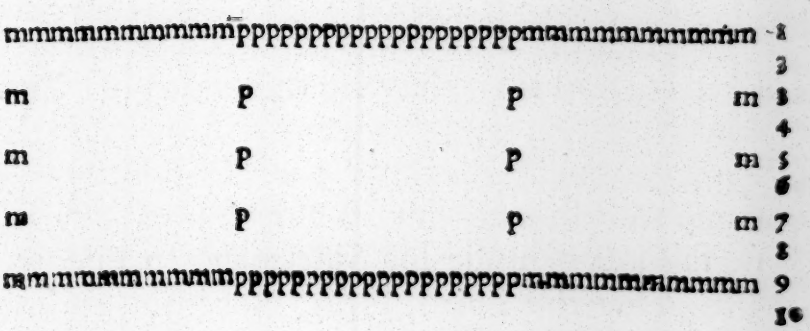
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Ranke$_3$

Rankes to your Right Hand as you were.

You muſt firſt t rne to your Right, becauſe you will come the better into your place; and then ſet forward your Right Foote, it is more ſeemely and Souldier like by much then any other way.

Becauſe you ſee there is an odde File of Muskatiers, you muſt place the Muskatiers all to the Right Flanke, and it is eaſely donne thus, cauſing the Left Wing to ſtand ſtill, and the reſt to mooue one pace forwards; then the word of Commaund is; Left Flanke to the Right Hand, and march through thy Files, which with eaſe is to be done.

Files to your Right Hand double.

There is occaſion ſometimes to ſtrengthen the Flankes, and then they vſe this word of Commaund, which is no more to performe then this, if it be to the Right Hand; then the Right Flanke ſtandeth ſtill, and the next File doubleth it, that is, fall iuſt behinde his Side-man, in File with him; Then the Third, Fifth, Seuenth, and euery other ſtands: Remember that you muſt make them doe it all at one motion together.

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Files as you were.

All thoſe that doubled, returne into their proper places, by ſetting their left Legge firſt to pace: Remember when you double to your right hand, you put your right Legge forward, and when on the left, your left Legge, and ſo backwards.

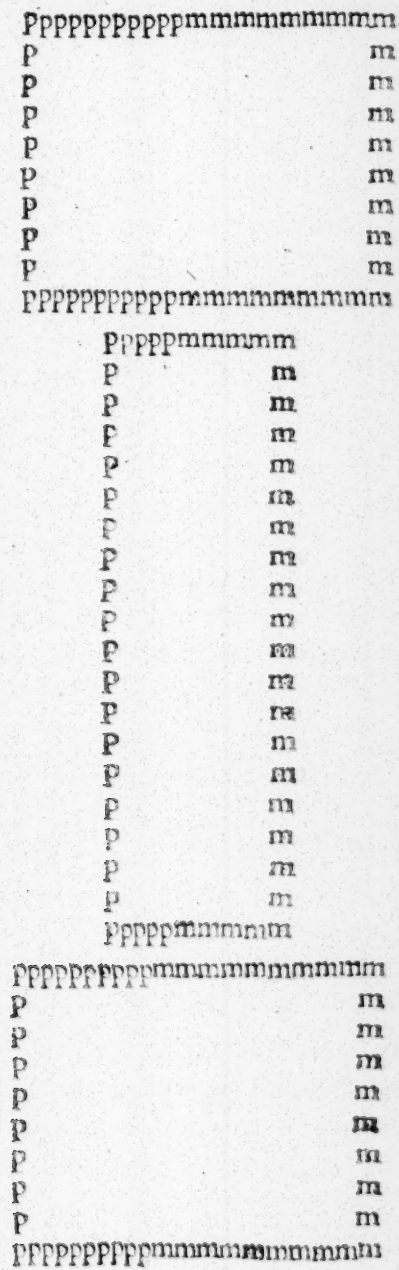
Files to your Left Hand double.

This motion differeth little from the other, ſaue that the left flancke doe ſtand ſtill, and the Second doubles it in this action; in doubling the left Legge, goeth to double, and the right comming backe.

Files as you were.

Is iuſt as the other was, ſaue they fall backe to the right hand, with the right legge.

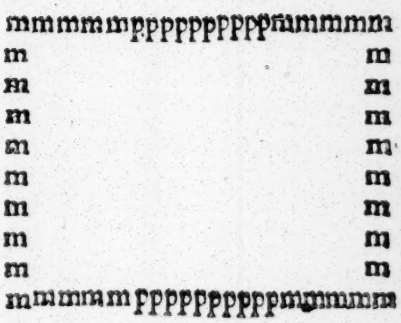
Hauing

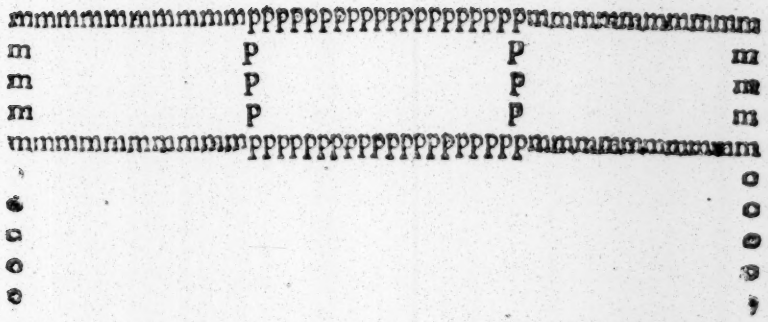


Hauing performed the doubling of Files, which was don with the Shot in the Right Hand Flanck of the Pikes: Now you muſt place them as they were before, one halfe on the Right Flancke, the other on the Left of the Pikes.

Halfe Files to your Right Hand, Double your Rankes.

This muſt be done by the ſixt Rancke, and you muſt doe it at ten Paces thus; Firſt with your Right Leg ſet forward, you muſt March forward, and aduance your Ground towards the Front, all the Rancke obſeruing the Right Hand Leader, and ſo mooue altogether to the Front, with whom you muſt Ranke; obſeruing likewiſe that when you thus begin to double, you Aduance your Pikes, & when you haue doubled the Front, Order your Pikes, the Sixt muſt rancke with the Firſt, the Seuenth with the Second, the Eight with the Third, and ſo all the reſt.





When you haue performed the former Motion, they muſt turne to the Right Hand, which is more gracefull and comely, with the Right Foote ſet forward, and ſo Retreate to the Reare, at ten Paces more, obſeruing your Left Hand, and then you will be tenn deepe againe as you were.

Halfe Files to your Left Hand,
Double your Rankes.

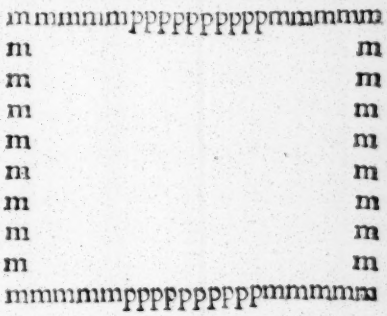
There is no difference, but onely that the halfe Files muſt march vp to the Left Hand of the Files that ſtand.

Halfe Files to the Right Hand,
As you were.

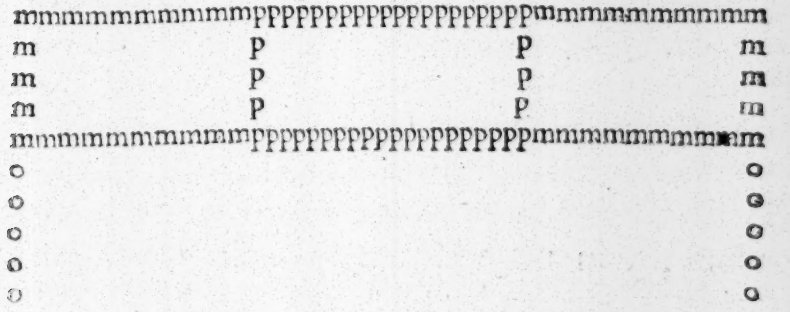
The halfe Files aduance their Pikes, and falles back with their Right Legge, to be cleare of their Side-men, & ſo march into their proper places.

Halfe

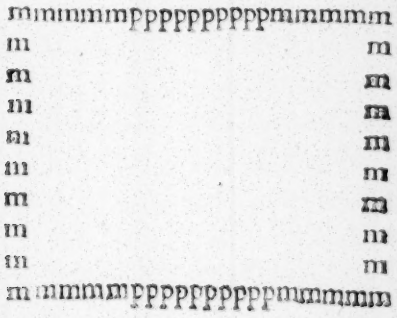
Halfe Files to your Right Hand, as you were.



Halfe Files to your Left Hand, double your Rankes.



Halfe Files to the Right Hand, as you were.



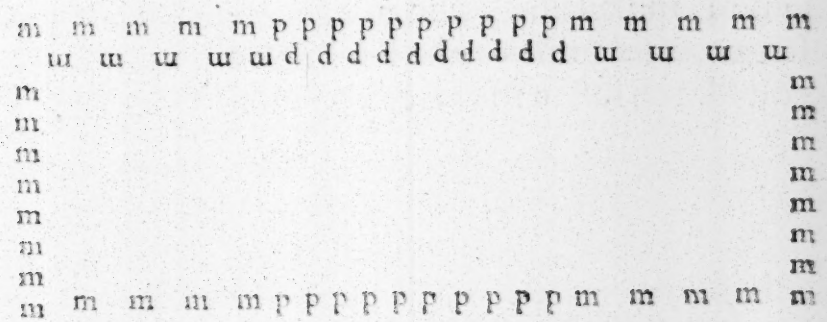
Files

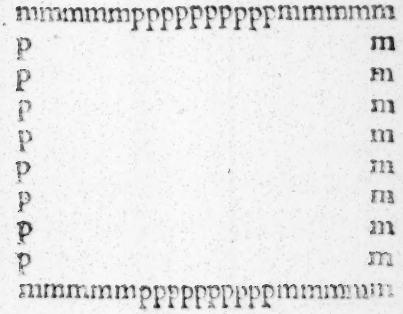
Files to your Right hand Countermarch:

When a Charge is expected in the Reare, and it being thought conuenient to haue the Leaders of the Files in the places of the bringers vp, becauſe they are men beſt able to receiue the Enemie. The Leaders aduancing with their Right Legge turned to the Right Hand, and march downe towards the Reare, all the body of the Company, mouing together: for when the firſt Filers turne, the Second aduanceth in their places, and doth the like, and ſo Third, Fourth, and Fifth,&c. There is alſo another kinde of Countermarch, which is called the *Lacedemonian Countermarch*, which is for the Firſt Rancke to Face towards the Reare; the Second, and all the reſt of the Body to March vp, and turne behinde their Leaders, you may Countermarch likewiſe by Ranckes as you doe by Files.

Files

Files to your Right Hand,
Counter-march.





Files to your Right Hand Countermarch.

This motion differeth nothing in the world from the other, for you muſt turne vp on the ſame Hand againe, and aduance with the Left Legge, and turne to the Right Hand, and then you March iuſt in the place you were in before.

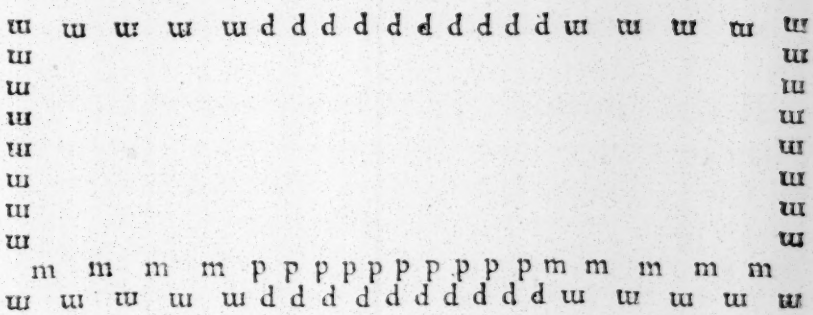
Cloſe your Files both wayes at a Foote and Halfe.

If a Charge of Horſe bee expected, then the Foote are to be in the cloſeſt Order, which is one Foote and a Halfe in File, and there in Rancke.

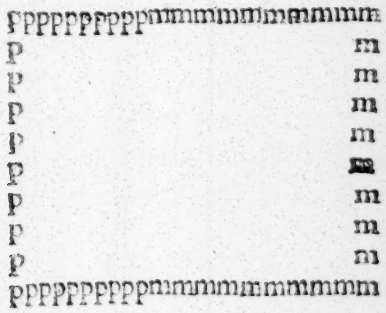
Cloſe your Ranckes to three Foote.

Which is nothing elſe, but to Pace on to the Sword point, which is the iuſt diſtance of Three Foote.

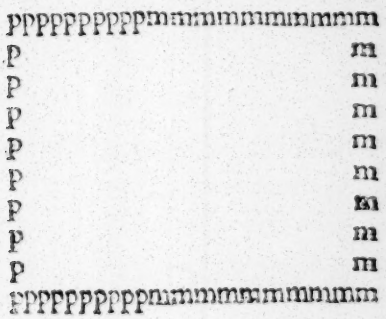
Ranckes



Close your Files a Foot and a halfe.



Close your rankes to three Foot.



Rankes to the Right Hand wheele.

If the Enemie Charge on the Right Hand Flancke, to receiue them with the moſt able men which are commonly in the Front, it may be thus performed; the Leader of the Right Hand File ſtandeth fixed, onely turning his body, and the reſt moue vpon him as the Centre, obſeruing ſtill the diſtance and ſtraightneſſe of their Rancks and File, without which, this motion will not be performed gracefully.

Rancks to your Left Hand wheele.

There is no difference in the performance of this motion, and the latter, but that the Left Hand Leader ſtands, and the reſt wheeles towards him.

Rankes to the Right Hand wheele vpon a Center.

All to the Right Hand of the middle of the Front goe backwards, and on the Left forwards.

Rancks to the Left Hand wheele vpon the Center.

All the Left Hand of the Center wheeles backwards, and the right forwards.

Rankes to your Right Hand Wheele.

Rankes to your Left Hand Wheele.

Rankes to your Right Hand wheele vp-
on the Center.

Rankes to your Left hand, wheele vp-
on the Center.

Open your Ranckes backward.

To open the Banckes, vnderſtand that the Front or Firſt Rancke ſtandeth ſtill, and the other nine Ranckes fall backwards altogether, vntill the Second Rancke bee Sixe Foote diſtant from the firſt, and then it ſtands ſtill: ſo likewiſe muſt you doe with all the Ranckes, vntill they bee diſtant ſixe foote one from another.

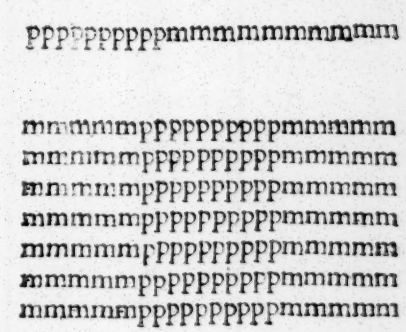
Open your Files both wayes.

In opening your Files, halfe the body moue towards the right hand, and halfe towards the left hand ingroſſe, and then the two middlemoſt files when they are three foote diſtant, ſtand ſtill, and the reſt of the body continues mooving both wayes vntill the next two files, are diſtant three foote more, and ſo of all the reſt.

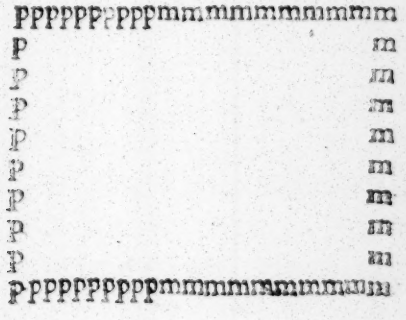
Here you are in your Order as you were at firſt, three foote in File, and ſixe foote in Rancke.

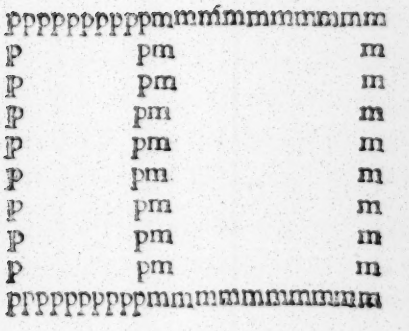
Open

Open your rankes Backwards.



Open your Files both wayes.





How to exerciſe Muskatieres.

First Rancke giue Fire, and Countermarch to the Reare.

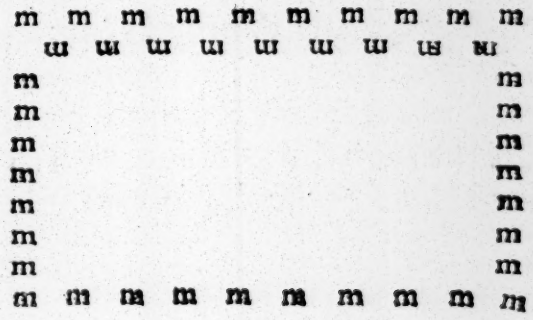
First, you muſt vnderſtand that they muſt bee three foote in file, and three foote in rancke, and then the Captain giues the Word of Command, and they Countermarch to the reare, and there ranke: note alwayes that you Countermarch ſtill to the right hand, and neuer to the left: this is done ſtanding, and therefore looſeth ground; ſome will ſay Countermarching with Muskets in skirmiſhing is improper, but I ſay it is as the ſcituation is, for if you haue but little ground to make a front, and haue a bigg front to oppoſe you, then you may vſe Countermarching, becauſe you haue not ground enough for to fight by diuiſions.

The Second Order.

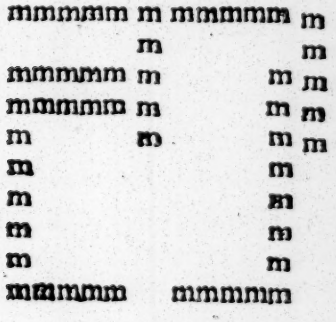
You muſt make a diuiſion in the midſt, of ſixe foote, then the Captaine commands firſt and ſecond ranks, make ready, and then Marcheth with them ſome ſixe paces from the front, and then ſayes, Firſt rancke giue fire, which when they haue performed, they Marchone halfe through the Deuiſion, and the other by the right flancke to the Reare.

The

First Ranke giue Fire and Countermarch to the Reare.



First and second Rankes make ready: First Rranke giue Fire, &c.



The Third Order.

As you did before, ſo you muſt doe now, but that as ſoone as you haue drawne out the two firſt rancks, and when the firſt is come in place to preſent, you may vſe this Word of Command, *Second Rancke to your right hand, Double your Front, and giue Fire then as you were:* Laſtly, let them March one halfe through the Diuiſion, and the other by the right hand flancke, as afore to the rancke in the reare; obſerue that as ſoone as the firſt falls off to the reare; the ſecond immediatly followes, and this demonſtration is of gayning ground, for the body is ſtill marching ſoftly forward.

The Fourth Order.

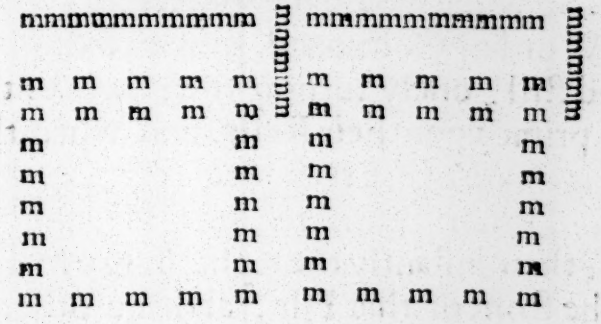
The Company retreating, the Captaine ſayes to the laſt rancke, *To the right hand about and giue Fire*, and then they rancke in the reare, and performes the ſame, the one halfe marcheth through the Deuiſion, and the other by the right hand flancke, to the front, and ſo by the laſt ranke continually; this is an order of looſing ground.

The Fifth Order.

Vpon your Retreate, the Enemie following hard neere you, to annoy them, you cauſe the laſt rancke to double the reare ſtill, and giue Fire, which before you gaue Fire with ten; now you doe with twenty, and ſo done, they March in their places as afore.

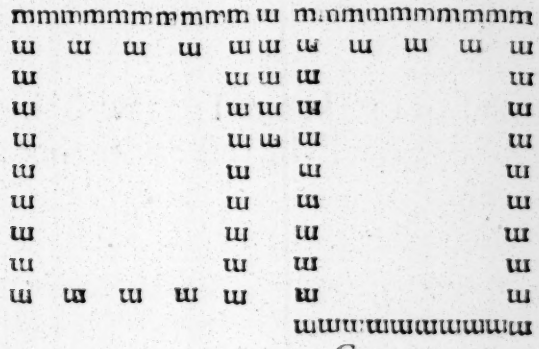
Second

Second Ranke to the right Hand double your Front, and giue Fire.



Laſt Ranke to the right Hand about, and giue fire.

Laſt Ranke to the right Hand about, double your Reare, and giue Fire.



The Sixth Order.

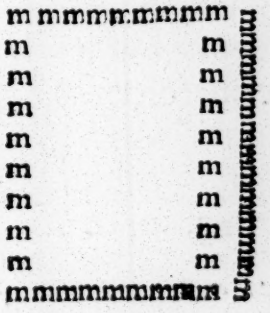
To this Order you must make no Diuision at all, and when you haue giuen Fire according to the Word of Command, you must cause them to stand still, onely turning their faces to the front, and prime vpon their Rests, and when the other File is cleare of the right flanke, they performe the like, I meane, turne to the right hand, and giue fire; then instantly the right flanke Marcheth vp to the front of that File, and the other File primeth vpon their Rest the while, and so all the Files doth the like: note that the body still Marcheth, this Order is vsed when you are Charged vpon the right flanke.

The Seauenth Order.

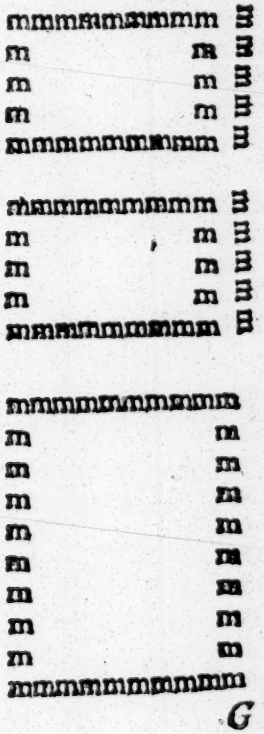
This order is all one with the last, saue that the flanke as soone as they haue giuen fire, the one halfe marcheth through the Diuision, and the other by the reare, and rankes in the left flanke, iust as they were before; so the second, third, and all the Files, one after another giues fire.

You must cause the first ranke to giue fire, and stand, then the second rancke doth March vp through the first rancke and Files with them, and giues fire, and so of all the rest: note that as soone as the second ranke begins to moue, the body all moues vp to the same distance, as their Order was at first.

Right Flanke to the right Hand, and giue fire:
Prime on your Rests.



Right Flanke to the right Hand, and giue fire.



The Eighth Order.

Closing your Diuision, you cause the Company to March, and commaund them, make ready all together, then you giue the Word of Command to them, as soone as they haue discharged, they must Countermarch to the reare; this Order is getting ground, all one with the first Order, saue one marcheth and getteth ground, the other standeth and looseth ground.

The Ninth Order.

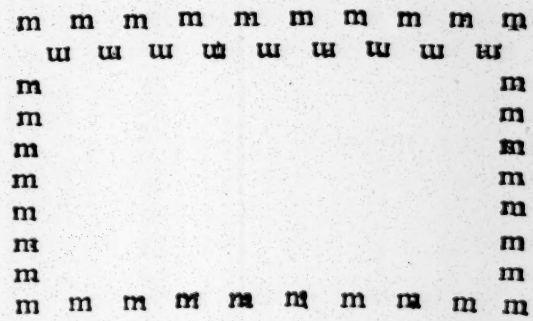
The Captaine commaunds them to make readie altogether, then saith to the first ranke, *Giue fire*, which done, the one halfe of the Pikes marcheth through the midst of the body, which for that end is deuided, euery man falling into his owne File; this Order is standing, and moues only by rankes.

The Tenth Order.

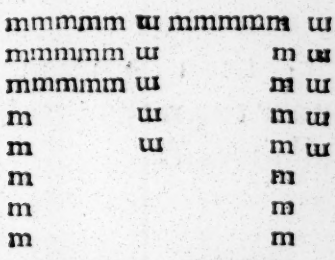
As you are marching, the right flanke stands still, and the second File, which is next vnto doubles him, and then they turne to the right hand, and giues fire, presently vpon that they fall into their first Order, and primes vpon their rest, vntill the rest of the Company bee cleare of them, and then the two vtmost files againe doth the like; looke vpon the sixt Order, and there is no difference, but onely still in doubling the flanckes.

First

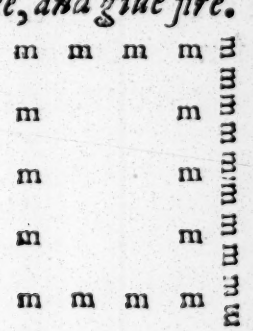
First Ranke giue Fire and Countermarch to the Reare.



First Ranke giue Fire:



First File to your right Hand, double your Flanke, and giue fire.



The Eleuenth Order.

This Order differeth nothing from the laſt, but onely the action muſt bee performed on the left hand.

The Twelfth Order.

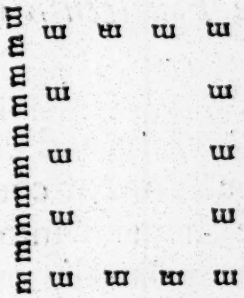
Firſt, you muſt cauſe the ſecond rancke to double the firſt; then commaund them as they were; next, make them two rankes to Countermarch: ſo of all the reſt.

The Thirteenth Order.

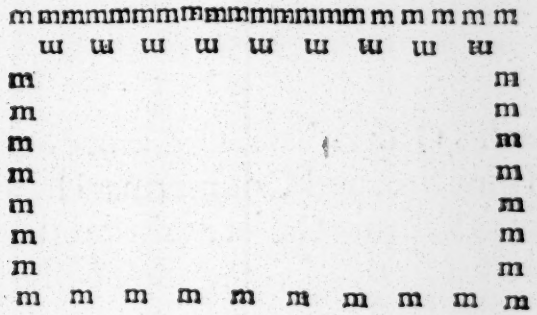
Let the firſt rancke giue Fire, and Countermarch, the ſecond muſt March vp where the front was before, and giue fire as the firſt did, and ſo of all the reſt.

The

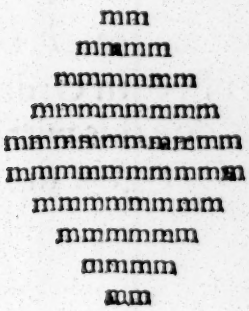
First File to your left Hand, double your Flanke, and giue fire.



First and second Ranke make ready, second Ranke double your Front, and giue Fire.



First Ranke giue Fire, and Countermarch to the Reare.



The Fourteenth Order.

The ſecond, third, and fourth Rankes, muſt March vp, and giue Fire, and Countermarch; ſo likewiſe the ſame Word of commaund, muſt bee vſed ſtill to make them fall into a ſquare, ſo ſhall you haue a ſquare Battalia out of a Diamond, thus.

The Fifteenth Order.

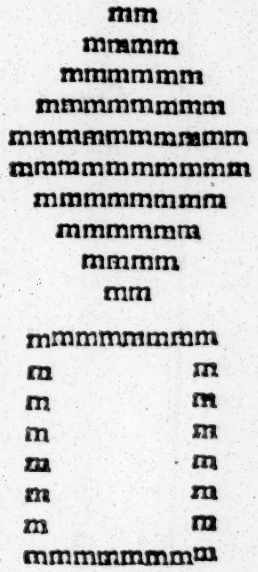
To this Order, there is no more but commaund them giue fire, and Countermarch, and they will fall into the ſame Order as they did before, if you would get ground, they muſt March, if looſe ground, they muſt ſtand ſtill.

The Sixteenth Order.

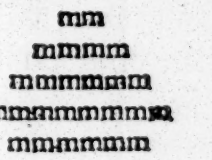
Looke in the fifteenth Order, and as you did that, ſo muſt you doe this without any alteration, obſeruing that eight giue fire at one time, and no more.

Right

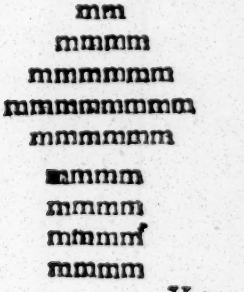
Right and left hand files of the second, third, and *fourth Ranke march vp, giue fire, and counter-march to the Reare.*



First Ranke giue fire, and Counter-march.



First Ranke giue fire and Countermarch to make a Square.



The Seuenteenth Order.

The rankes muſt be ten foote aſunder if the files be fiue, if ſixe, then they muſt be twelue, and as ſoone as you haue giuen the word of Command, they fall into one file, the right hand flanke ſtanding ſtill, onely turning his face to the right hand, and ſo likewiſe if any occaſion ſerue, you may performe it on the left hand, as followeth in the next Order.

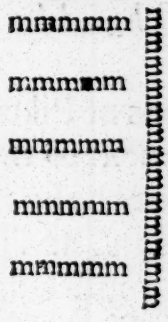
The Eighteenth Order.

The ſame Order you obſerued on the right, the like muſt you doe on the left; remember that the files when they doe this, muſt be in their cloſeſt Order: alſo if you haue any occaſion, you may doe it both wayes at once by making a diuiſion in the midſt, the word of Command, is *Rankes to your right and left hand*, by Conuerſion, but then your files muſt be euen, as foure, or ſixe, or eight, or any other euen number, the which is performed in the next following Order.

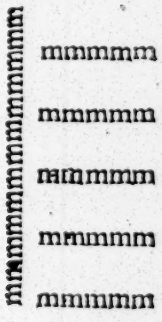
Ranks to your right and left hand by Conuerſion.

This Order is done by making a deuiſion in the middle, to charge the Enemie vpon both flankes, or for to make a lane for great Ordnance, to play betweene them, and is no more but to cauſe them to be done at once, iuſt as the former is, onely you muſt turne to the right and left hand in your Conuerſion. Some doe hold that the proper word is, *Wheele to the right and left hand*, now you are acquainted with both, chooſe of the two which you liſt.

Rankes to the right Hand by Conuerſion and giue fire.



Rankes to your left Hand by Conuerſion and giue Fire.



Rankes to your right and left Hand by Conuerſion, and giue Fire.

Deuiſions of Pikes and Muskatieres to your right and left hand by Conuerſion.

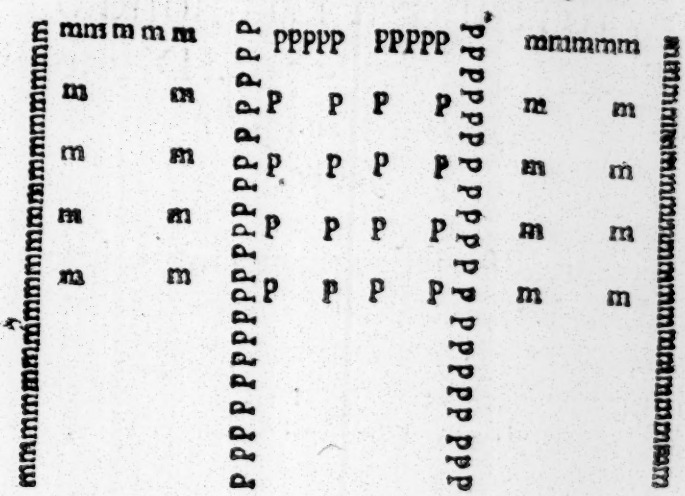
Make two deuiſions of Pikes, and two of Muſkets, then the Pikes next to the right hand deuiſion, of that muſt turne to the right flanke of Muſkatieres by Conuerſion, and the Pikes next the left flanke of that, muſt conuert themſelues to that deuiſion, and the Shot alſo, as they did in the precedent Order, ſo ſhall you make of twenty files but foure files onely.

The Twentieth Order.

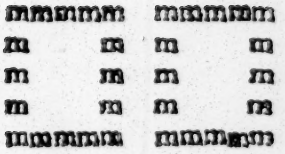
If you pleaſe you may diſcharge by doubling your rankes, or by fingling; as you ſee occaſion you muſt commaund them to make ready altogether, this Order is of great force.

Deuiſions

Deuiſions of Pikes and Muskatiers to your Right and Lelft hand by Conuerſion.



Frontiers giue fire, and fall off through Deuiſions.



How to reduce a Diamond out of a Square, and alſo out of a Diamond, *into a trianguler forme.*

If you are diſpoſed to turne a ſquare into a Diamond, looke vpon this figure, and you may eaſily performe it, it is no more but to turne their faces to him that leades the right or left hand file, and ſo march with the Corner forwards: Likewiſe out of a Diamond to make ſuddenly a triangle: firſt *I* as you ſee marcheth vp to make euen with *D* and *K*, then *N O*, the reſt as you ſee it performed in the figure: note that any iuſt ſquare will make a Diamond, and out of a Diamond a triangular faſhion, and no other number will make them but a iuſt ſquare.

A B C D E
F G H I K
L M N O P
Q R S T V
W X Y Z &

The reaſon I ſet downe here ſo many ſeuerall ſorts of Battalias, is, becauſe you muſt when you Imbattell, order them according to the ſcituation, wherefore you cannot obſerue one order, therefore as you finde cauſe take choyſe, for variety is neuer hurtfull.

The firſt Battalia of Pikes and Muskets.

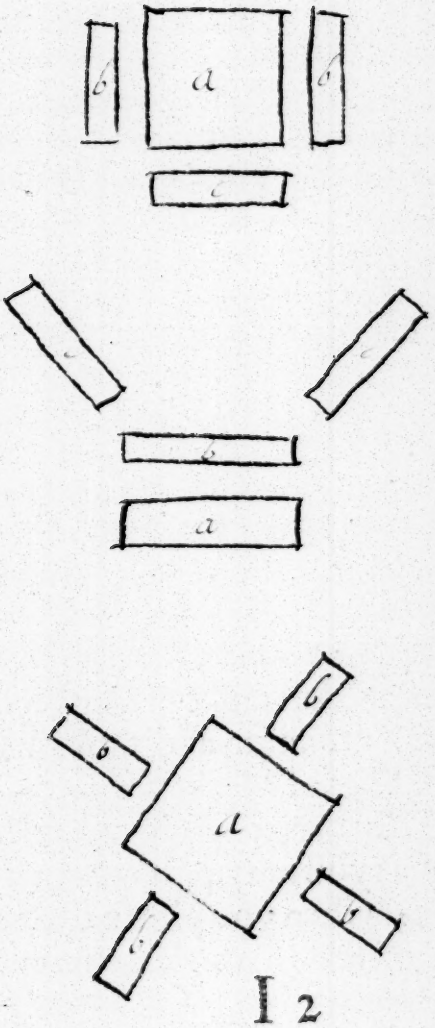
The ſquare that you ſee marked with *A*, muſt be 49. Pikes, ſeauen times ſeauen, and three in the reare; the two flankes marked with *B* 18. a peece, which are three files, and ſixe deepe, the reare *C* ſeauen files, and three deepe.

100.

The ſquare *A* in the ſecond Battalia, is 49. whoſe roote is ſeauen, the front *B* is ſeauen files and three deepe; the two flankes *C* are three files a peece, and ſixe deepe.

204.

The Diamond in the midſt *A*, muſt be 84. beginning firſt with two, next with foure, and ſo Diamond wiſe, vntill you come vnto 84. the foure croſſes *B*, flankes 30. a peece, fiue in file, and ſixe deepe.

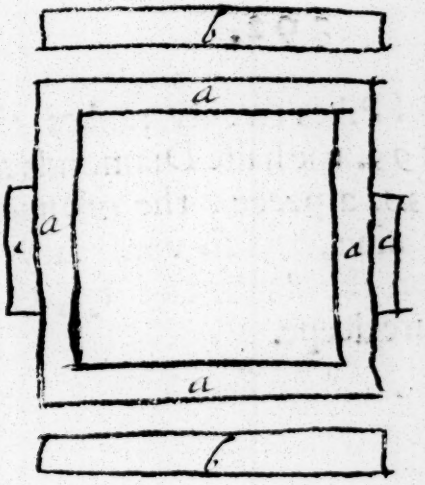

b
a
b
c
c
c
a
b
a
b
a
c
c

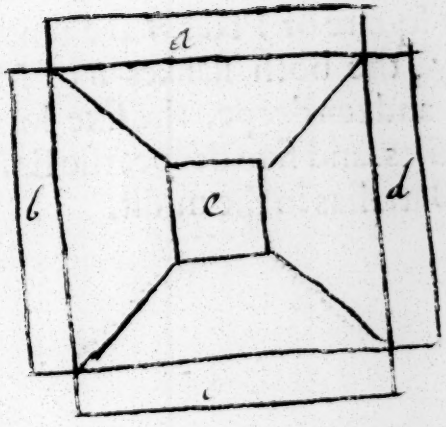
200.

The Border that muſt goe round the ſquare *A*, muſt containe 90. Pikes, the vppermoſt muſt haue 11. Files, and three deepe, the lowermoſt as many, placed in the ſame manner, flankt with three Files, and foure deepe, the odde you muſt place in the front and reare, which are ten: the wings of Muskets *B* are foure Files, and ten deepe, at the front and reare of the Pikes *C*, are fiue Files, and two deepe: when you ſee cauſe, the Shott may retire in within the Pikes, and when you liſt iſſue out againe; the midſt of the Battalia marked with *D* are empty for the Shott to retire in.

301.

The front *A*, reare *C*, and both wings *B* and *D* are Muskateres, the laſt ranke of Muskets (I meane of euery flanke) are mixt and rankt with Pikes, there are three Files of Muskets eleuen deepe, the Pikes *E* are 13. ſquare, charging to euery corner of the Battalia, as you may perceiue by the forme of the Battalia; when you pleaſe the Shott may retreat in within the Pikes, from any noyance of Horſe.


b
a
a
a
a
a
b

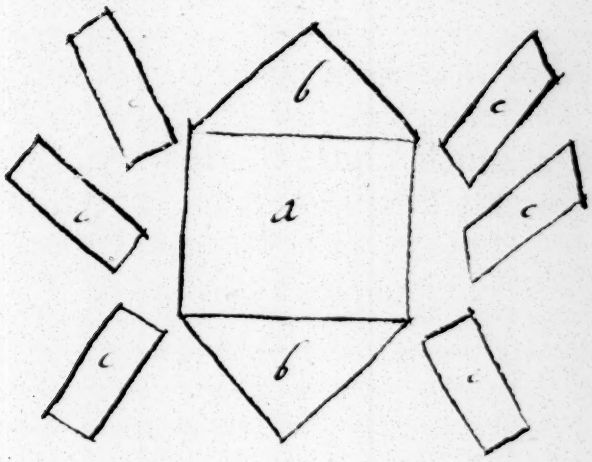

a
b
c
d
c

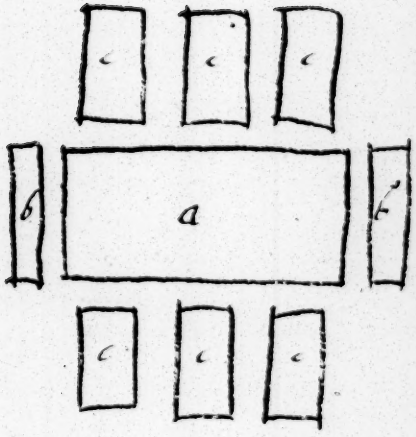
392.

The ſquare *A* of Pikes twenty rankes, the files tenne, which is 195. the halfe Diamonds *B* in the front and reare 36. a peece, the ground ranke eleuen, the next nine, and ſo vntill they be 36. the ſixe wings *C* on the flanks twenty, each one fiue files, and foure deepe.

400.

The long ſquare of Pikes *A* are ten rankes, the files twenty, the both flankes *B* of Muskets 80. foure files, and ten deepe, the ſixe looſe wings *C* 120. foure files, and fiue deepe, the Enſignes in all manner of Battalias in the midſt.


b
c
c
c
a
c
c
b
c

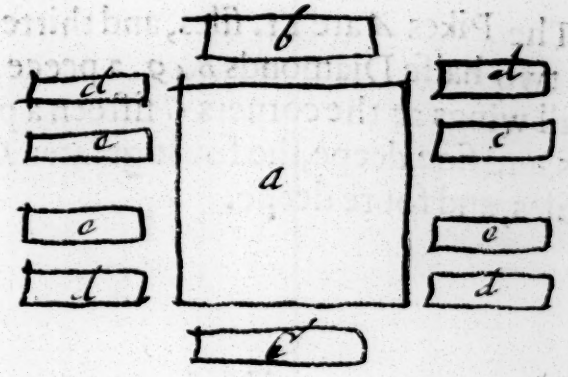

c
c
c
b
a
b
c
c
c

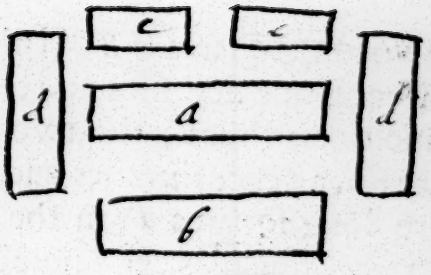
506.

The Pikes *A* ſixteene ſquare, the Forlorne Hope *B* 55. that is foure rankes, and eleuen in file, the reare *C* as much more, the foure ſmall wings *D* in the corners fifteene a peece, fiue files and foure deepe, the foure other wings *E* in the flanks are fiue Files, and foure deepe alſo.

600.

The two ſquadrons of Pikes *A* and *B*, are 144. a peece, eighteene Files, and eight deepe, which amount vnto 288. the twelue odde Pikes place in the reare of the laſt deuiſion of Pikes, the deuiſions of Shott in the front *C*, are 64. a peece, that is ſixteene files and foure deepe, the flankes *D* are eight files, and fourteene deepe, which are 236. the foure odde place in the reare.





K

511.

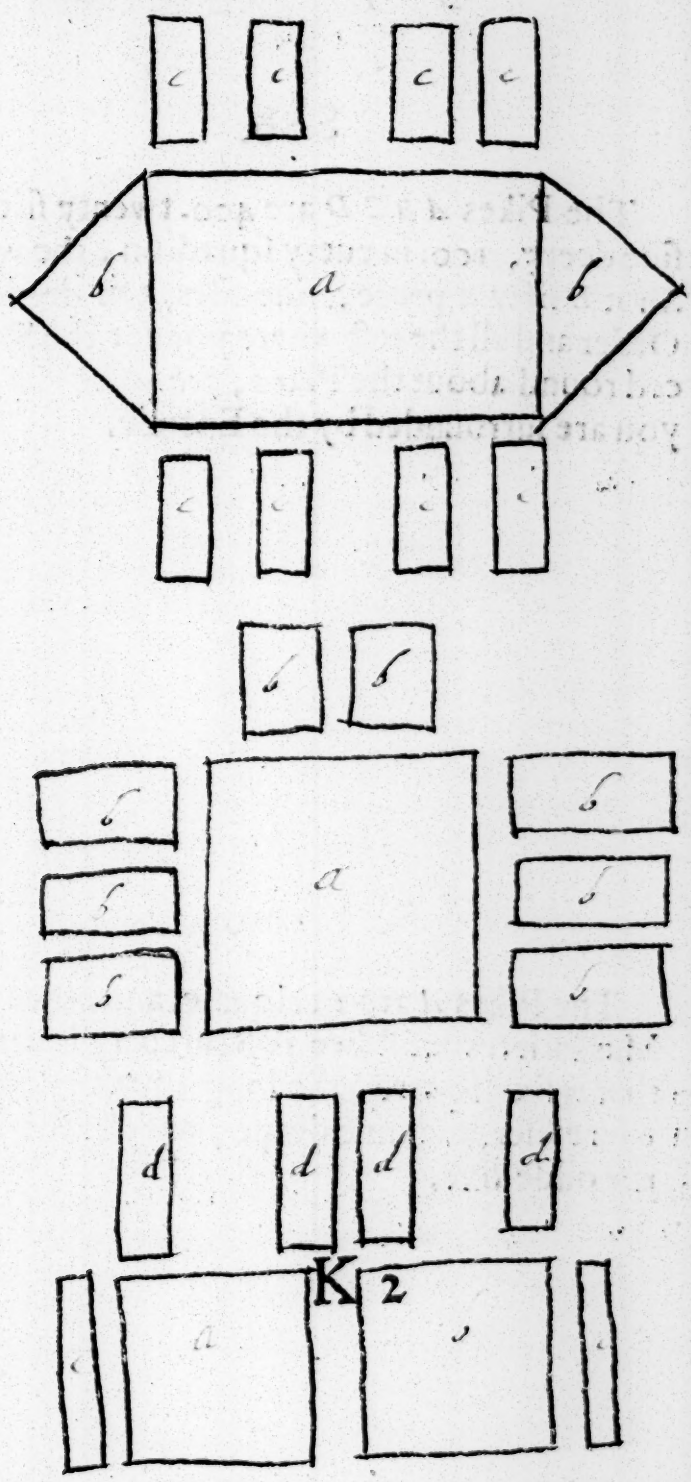
The Pikes *A* are 21. files, and thirteene deepe, the two halfe Diamonds *B* 49. a peece, the foure ſmall wings at the corners *C* fifteen a peece three files, and fiue deepe, the foure greater *D* are twenty files, and foure deepe.

714.

The Pikes *A* are eighteene ſquare, and the remainder 26. the wings of Shot marked with *B* are eight, ſixe files, and eight deepe a peece.

750.

The two long ſquares *A B* of Pikes in the midſt, are 180. each one fiue files and eighteene deepe, and tenne odde Pikes, the two flankes of Muſkets *C* are 90. a peece ſixe files, and fifteene deepe, the foure long ſquares *D* in the front 180. that is 45. a peece, fiue files, and nine deepe.


c
c
c
c
b
a
b
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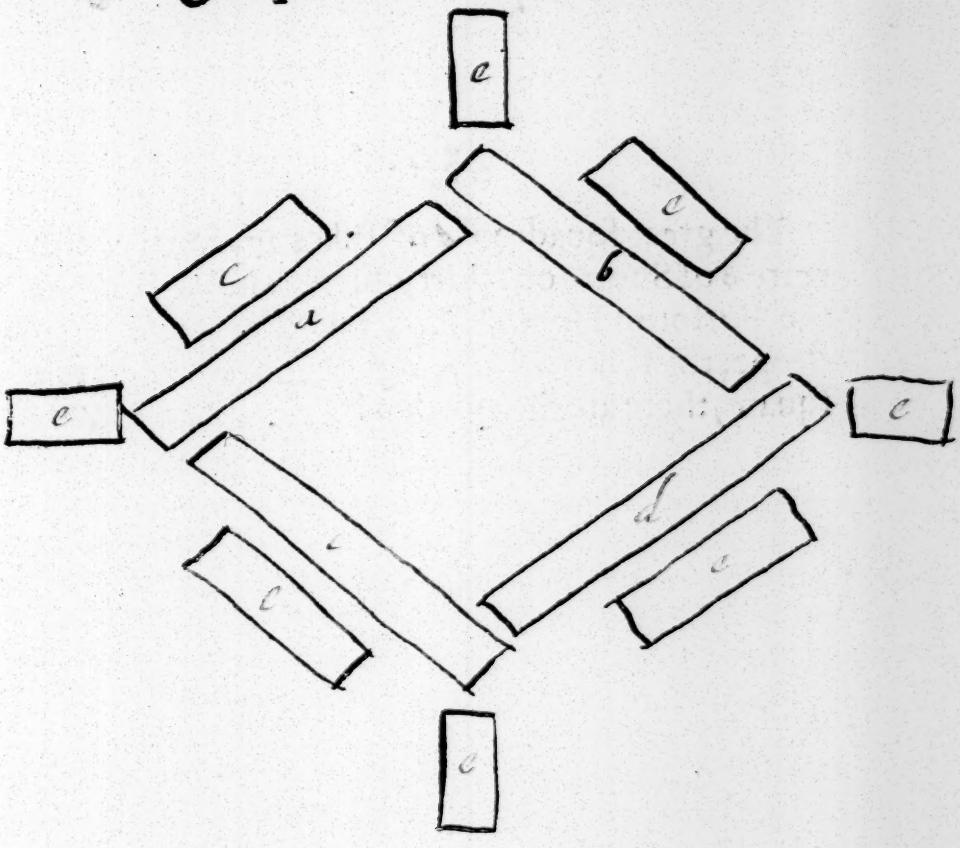
c
c
c
b
b
b
a
b
b
b
d
d
d
d
c
a
K 2
b
c

800.

The Pikes *A B C D* are 400. twenty files, and fiue deepe, 100. in euery ſquadron, the wings of Shot *E* fifty a peece, fiue files, ten deepe: this Order and all the reſt where you ſee the Shot placed round about the Pikes, are to be vſed where you are ſurrounded by the Enemie.

900.

The Pikes *A* are 21. ſquare, and nine odde, the Muskatieres muſt bee 108. in euery ſquare *B*, 36. that is ſixe ſquare, the long ſquares *C* 36. more, foure files, and nine deepe, which are in all 444. the odde ſixe.


e
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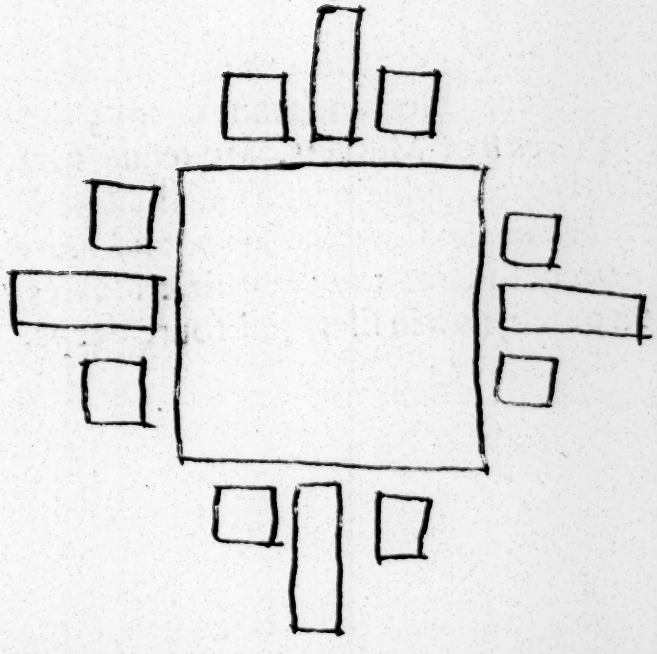
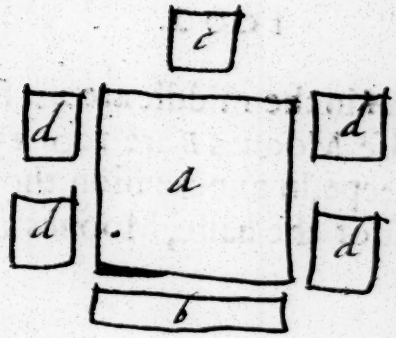


1500.

The great ſquadron *A* of Pikes 27. ſquare, the reare *B* of Shott 300. thirty files, and ten deepe, the Forlorne Hope *C* fifty, fiue files, and tenne deepe, the foure other wings *D* 100. which is ten ſquare, there are thirty odde Pikes.

2000.

The foure long ſquadrons of Pikes *A* are 250. a peece, twenty files, and tenne deepe, the foure long ſquares *B* of Muskets, are tenne files, and twelue deepe, which are 480. the ſixe leſſer *C* which are in the Forlorne Hope and reare, are nine a peece ſquare, the two little ſquares *D* are eight a peece, two in files, and foure deepe.


c
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a
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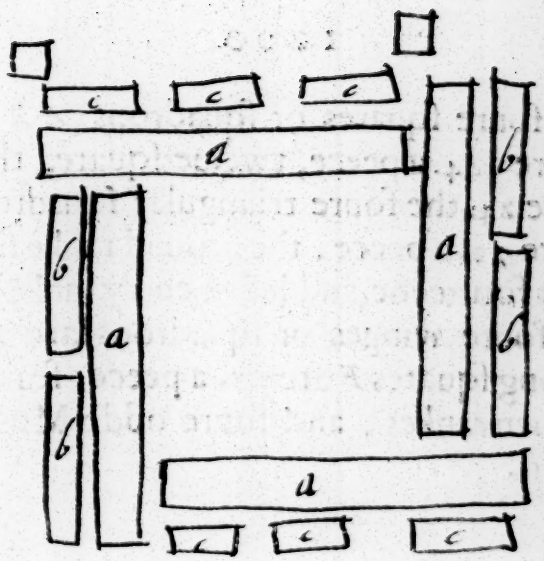
d
b

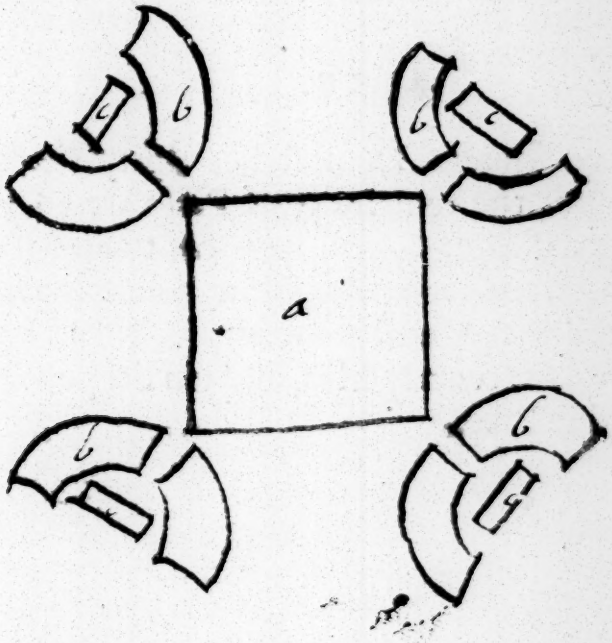

c
c
c
a
b
b
a
a
b
b
a
c
c
c

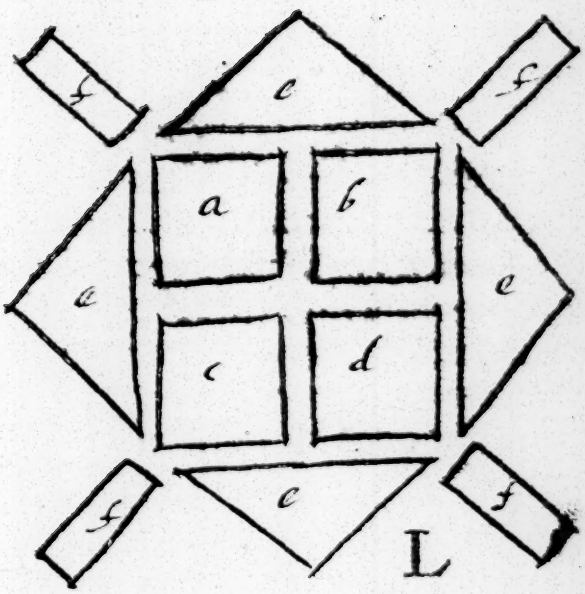
1000.

The ſquare *A* in the middle are 22. Pikes euery way, the halfe Moones *B* are 100. a peece, files fiue, and ten deepe, in one deuiſion, the long wings *C* in the midſt of the halfe, Moones are ſix files, foure deepe.

1200.

The foure ſquares or ſquadrons *A B C D* of Pikes, are 144. a peece, twelue ſquare, the odde Pikes are 24. the foure triangular ſquadrons *E* of Shot, are 72. a peece, the ground ranke ſixteene, the next fourteene, and leſſen euery ranke by two, which foure winges or ſquadrons are 288. the foure long ſquares *F* are 77. a peece, ſeauen files, and eleuen rankes, and foure odde Muskatieres vnplaced.



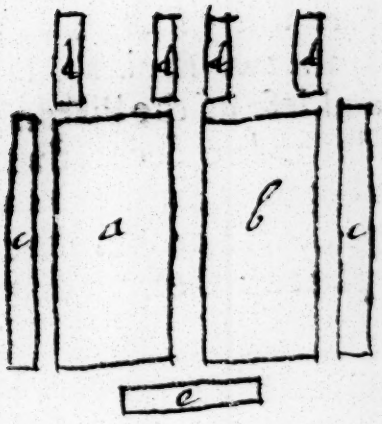


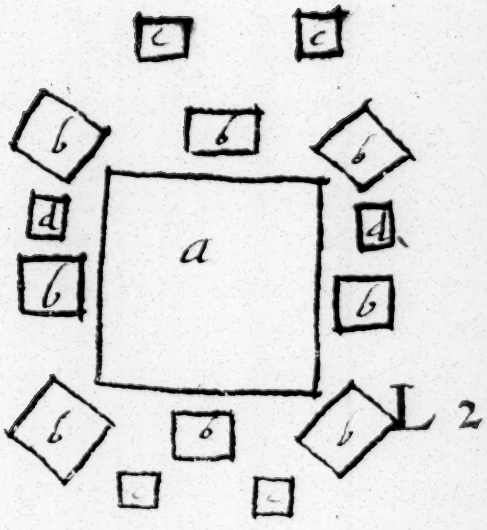
L

4500.

The two ſquares *A B* muſt bee thirty three a peece ſquare, the remainder of Pikes are 36. the two flankes of Shot *C*, 300. a peece, twelue files, and twenty fiue deepe, the foure wings *D* in the front 361. a peece, nineteene ſquare, the reare *E* are 206. Pikes, twenty files, and ten deepe, there are ſixe odde Pikes.

The great ſquare *A* muſt be fifty ſquare, euery one of the wings *B* 200. a peece, ten file, and twentie deepe, the ſmall wings in the front and reare *C*, which are ſquares, are 196. a peece, fourteene ſquare, the foure leſſer wings *D* in the right, and left hand flanke, are 56. a peece, ſeauen files, and eight deepe, and one odde Muskatiere.





L 2

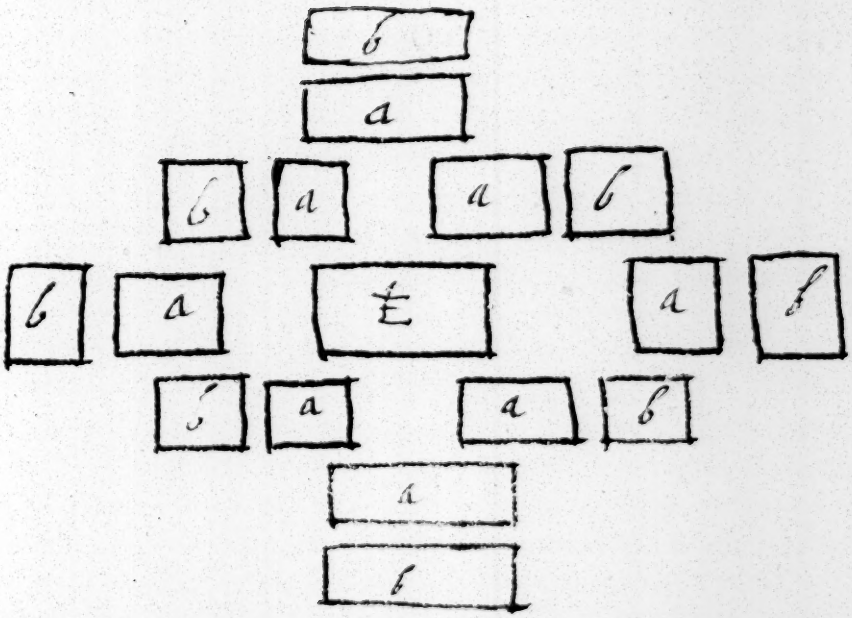
3000.

The Pikes *A* which are in the midſt, I meane the long ſquare are thirty files, and fifty deepe, which are 1500. the two flankes *C D* of Muskets on the right and left of the Pikes are 420. each one, that is ſix files, and 70. deepe, the two ſquares at the front and reare *D* are alſo 600. ten files, and thirty deepe, there are 60. ſhot remaining, which muſt be placed in the front or reare.

4000.

The ſquadrons of Pikes innermoſt, *A* are fifteene ſquare, and the odde Pikes are 224. which are placed in the midſt to guard the Enſignes, the Shot are all in the outſide, and are as many more ſquare; likewiſe the remainder of them are 208. if you note it, the Muskets may iſſue or retreat in within the Pikes vpon any occaſion, alſo the remainder of Pikes and Shot, may be placed in the midſt *C* to guard the Enſignes.

d
c
a
d
d

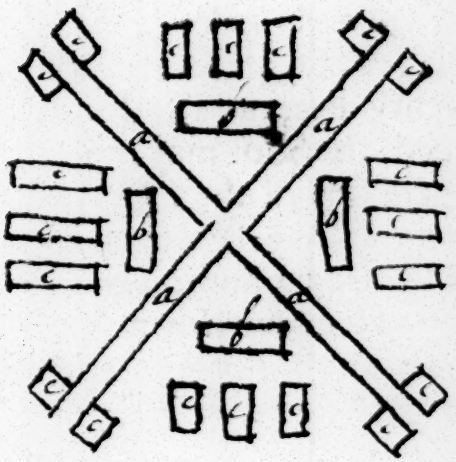

b
a
b
a
a
b
b
a
E
a
b
b
a
a
b
a
b

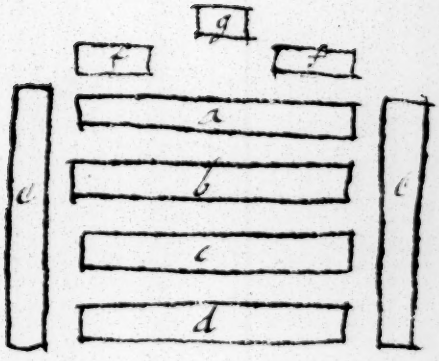
6000.

The long ſquares that are like vnto a Croſſe, are 510. a peece, fifteene in file, and 35. rankes, which are foure of them, that is in all 2040. the long ſquares *B* adioyning, are tenne files, and 24. deepe; the eight ſquares *C* that you ſee placed by the heads of the Croſſes, are Muskatieres, and are thirteene files, and fourteene deepe, 48. remaining, the twelue other wings *D* that are placed betwixt the heads of the Croſſes are 126. a peece, nine files, and fourteene deepe; but out of the 48. odde men, you muſt borrow twelue to make vp your full number.

6690.

The foure middle ſquadrons of Pikes *A B C D* re 860. a peece, 43. files, and twenty deepe, the wo flankes *E* of Muskatieres, are thirty files, and fty deepe, the two bigger ſquares *F* in the front, e one hundred a peece, ten ſquare, the leaſt *G*, at e head of them two are fifty, fiue files, and ten eepe.




g
f
f
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b
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d
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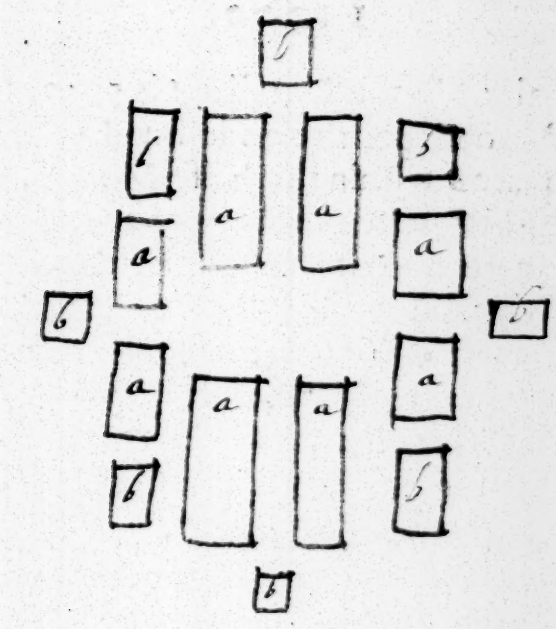
e

9000.

The eight ſquares *A* in the midſt, are 460. a peece, two files, and 28. deepe, the odde Pikes are ſixteene, all the out wings noted with *B* are Muſkatieres, twenty files, and 28. deepe, and as many Shot vnplaced, the Shot may retire through the lanes and galleries of the Pikes, then may the Pikes ioyne the longeſt wayes together, and make a iuſt ſquare to inuiron the Pikes; and againe when you ſee cauſe, forme your ſelues after this manner againe to skirmiſh with your Shott, this faſhion may be vſed with any number.

10000.

All thoſe ſquares you ſee within the circle noted with *A B C* are ſquadrons of Pikes, the foure great long ſquares muſt be 936. a peece, 36. files, and 26. deepe, the foure other long ſquares *B* are 206. a peece, twenty files, and tenne deepe, the ſquares at the corners *C* are 100. a peece, tenne ſquare. The Shott are all placed without the circumference noted with *D*, and doe containe 24. wings that will doe ſeruice all at one time without the hinderance one of another, two hundred each one, ten files, and twenty deepe, the remainder two hundred: vpon any occaſion, the wings of Shott may retire within the ſquadrons of Pikes, and the Pikes but ſtraighten their ſquadrons, will make a iuſt ſquare to ſecure and inpall the Shot from any anoyance of Horſe.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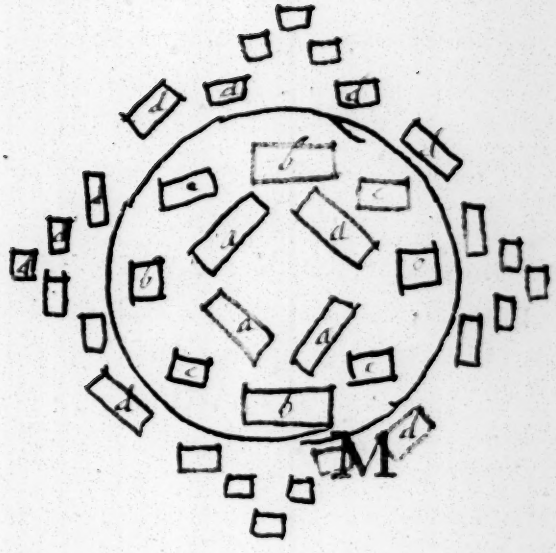
d
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b
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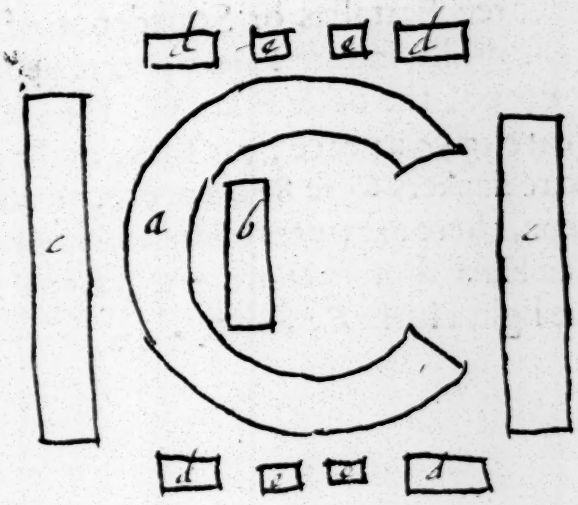
M

11000.

The halfe Moone Battalia *A* is 5400. twenty files, and 270 deepe, the odde hundred is placed in the ſquare *B* within the halfe Moone, to ſhut vp the Muskets, when the fury of the Horſe ſhall force them to retreat within the Pikes, the two longeſt ſquares *C* are 1000 a peece, twenty files, and fifty deepe, the foure other long ſquares *D* are 34 files, and 22 deepe, and eight vnplaced, the foure leſſer wings *E* in the middle of the foure laſt named, are 120 a peece, eight files, and twelue deepe, beſides twenty vnplaced.

12000.

The two middlemoſt ſquadrons with the foure corner ſquadrons marked with *P* are Pikes, the other ſixe marked with *M* are Muskets, and are 1000 a peece, wanting 39 each ſquadron and wing, which are in all 468, thoſe you may imploy for the guard of the Artillery, or in ſmall wings at your pleaſure.


d
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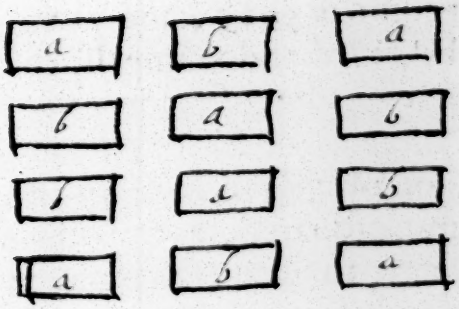
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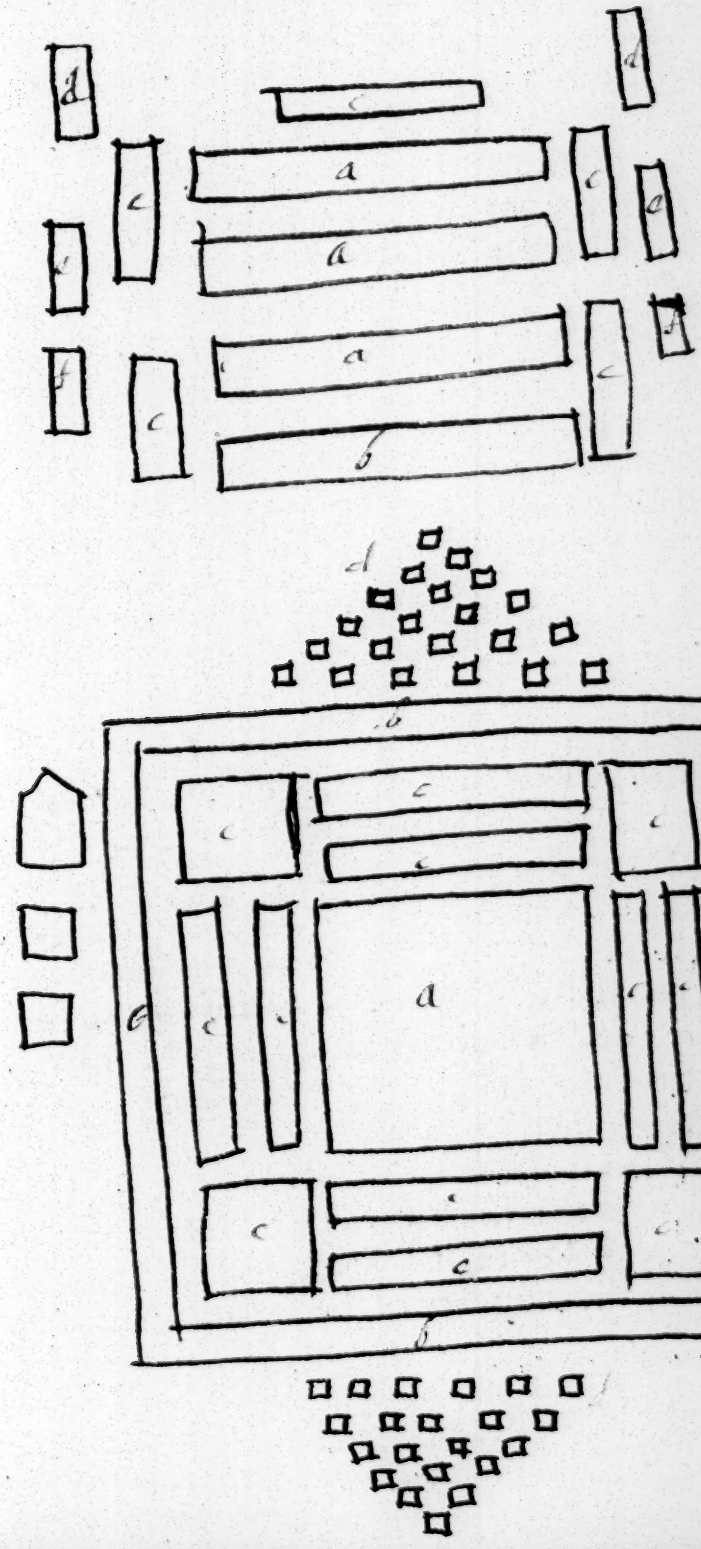
a

14000.

The three Battalias or Squadrons of Pikes *A* are in the midſt, and are 1310 a peece, 77 files, and thirty deepe, the odde Pikes 70, the Forlorne *B* and reare 1750 a peece, 70 files, and 25 deepe, the foure flankers *C* are 870 a peece, ten files, and 57 deepe, there are twenty Muskatieres to be ſpared, the Hargabuſers *D* are 200, Lances *E* 200, and the light Horſe *F* as many.

16000.

The great ſquare *A* in the middle is 77 ſquare, which ſome is 5929, and 71 vnplaced, the vtmoſt Pikes *B* that doe impall, the foure ſquares, and the eight long ſquadrons of Shot are 2000, fiue in file, and 100 deepe, the Forlorne Hope are 2100, one hundred in euery ſquare, the reare 2000 more ſquared, as the others are halfe Diamond way, the foure ſquares *D* in the corners are 96 a peece, fourteene ſquare, there are ſixteene vnplaced, the eight long ſquares are 385, each one 77 files, and fiue deepe: The Horſe *E* 6000, a thouſand in each wing.

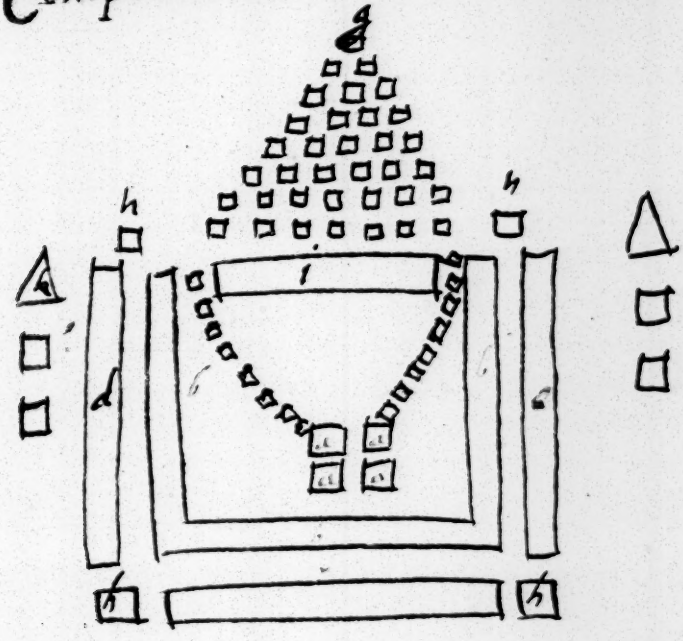

a
a
a
b
c
d
e
f

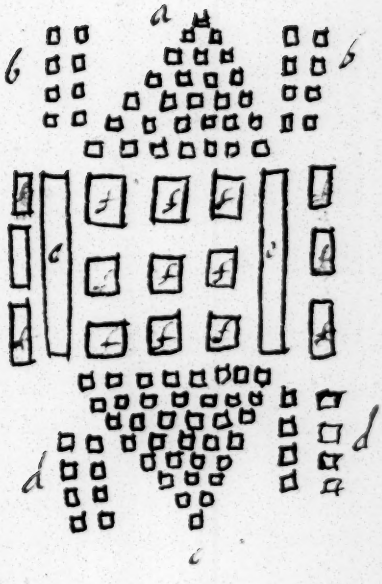
20000.

The foure ſquadrons *A* in the midſt, are 961 a peece, that is 31. ſquare, the Impall *B* are 4000 which is ten files, and 100 deepe, the ſquares *C* that comes from the Impalment *B* to the foure ſquares *A* in the midſt, are 1600, one hundred in euery ſquare, the long ſquare *I* in the foote is 300, ten deepe, and 30 files, the remainder 356 to guard the Ordnance, the flankes *D E* and reare of Shot 3000, ten files, and 100 deepe, the Forlorne Hope *G* 3000, an hundred each one; the foure ſquares *H* as the corners 441, twenty one ſquare a peece, the remainder 236, you may vſe as many Horſe as you pleaſe, and place them at the letter *K*.

22000.

The triangular Forlorne Hope *A* are 3600, a hundred in euery ſquare, the two wings *B* 800 a peece, the reare *C* triangular forme 2800, the wings *D* are alſo 800 a peece, the long ſquares *E* that flanke the Pikes 1400, which are 700 a peece, ſeauen files, and 100 deepe, the foure ſquadrons marked with *F* of Pikes, are 10304 each one, are 1156. which are 24 ſquare, the Horſe *G* 1000 a peece, and vpon any occaſion the reare may march vp through the lanes and galleries of the Squadrons of Pikes, to aſſiſt the Forlorne, and the Forlorne to retire backe, the odde Pikes are to cloſe in the galleries of Pikes, and to defend the Shot from the anoyance of the Enemies Horſe.



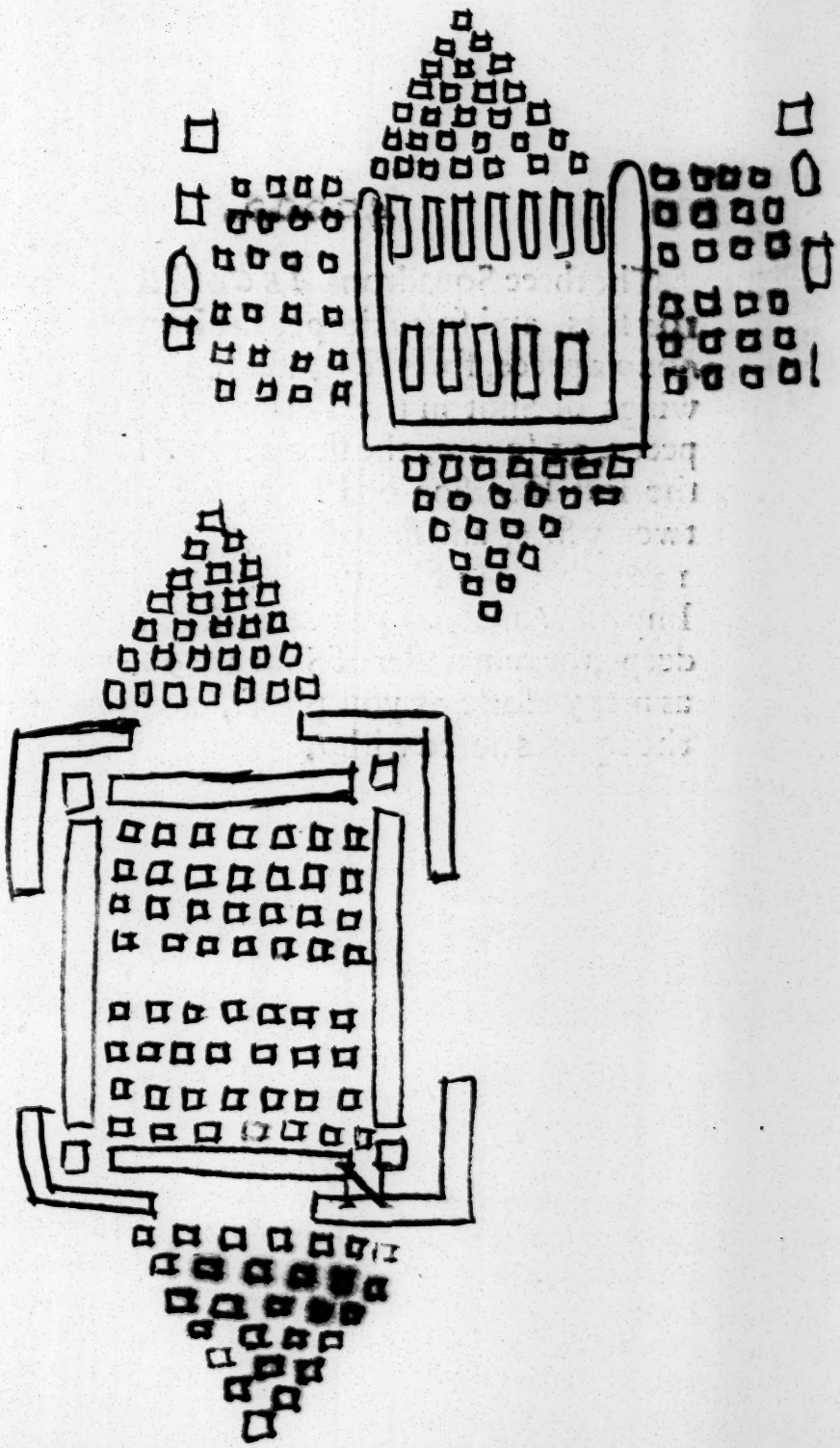


30400.

Euery one of the little ſquares are 100 men, ten ſquare, the long ſquadrons of Pikes *A* 2500 a peece, 25 files, and 100 deepe, the foure corners *B*, which are like right angles, are 1000 a peece, fifty files, and twenty deepe, the ſquares *C* in the corners, are 225 a peece, fifteene ſquare, the remainder are 100, by the figure here placed, you may plainely ſee how the Muskatieres may iſſue out, and againe retire in within the Pikes, vpon any occaſion as they ſee good, and vpon any occaſion the ſquadrons of Pikes *A B C*, may inuiron them in, and preſerue them from the aſſault and fury of the Horſe.

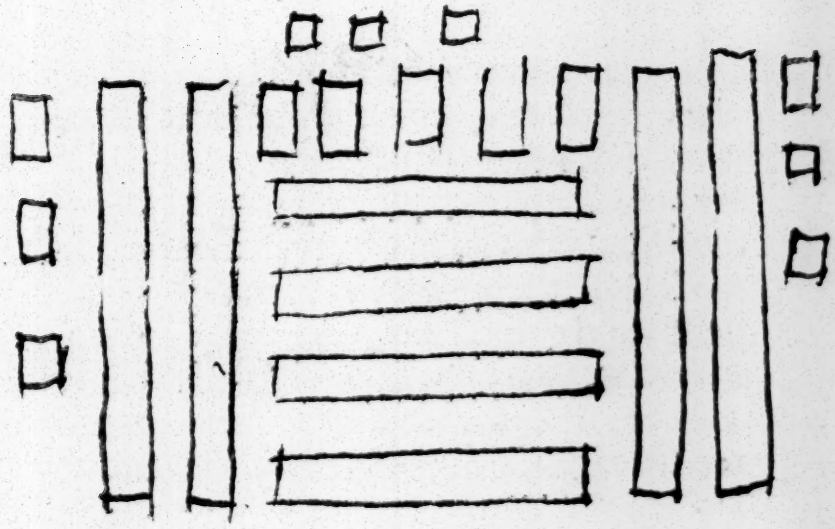
24000.

The Impall *A* is 133 deepe, and fifteene files, which is 5985, the Vanguard of Pikes *B*, which are eight ſquadrons, are 37 files, and ten deepe, which are 370 each one, which in all the eight ſquadrons are 2960, the reareward *C* are deuided into foure ſquadrons, 24 files, and ten deepe each one, which are 750 a peece; the totall of them foure are 3000, the remainder 55. Each of the wings of Shott which are 120 wings, are 100 a peece, ten ſquare, the Horſe *D* 6000, a thouſand in each Troope.



40000.

The three Squadrons *A B C* of Pikes, are 4000, 100 files, and forty deepe, the Impalls *D* alſo are 4000 a peece, forty files, and 100 deepe, the foure wings of Shot in the Forlorne Hope, are 961 a peece, 31 ſquare, the fiue wings *F* in the front of the firſt Deuiſion of Pikes, are 1000 a peece, twenty files, and fifty deepe, the reareward *G* are 1060, that is 53 files, and twenty deep, the vtmoſt Impalls *H* are 5000 a peece, fifty files, and 100 deepe, the remainder of Shot are 96: you may vſe as many Horſe as you pleaſe, and place them in the ſquares noted with *I*.

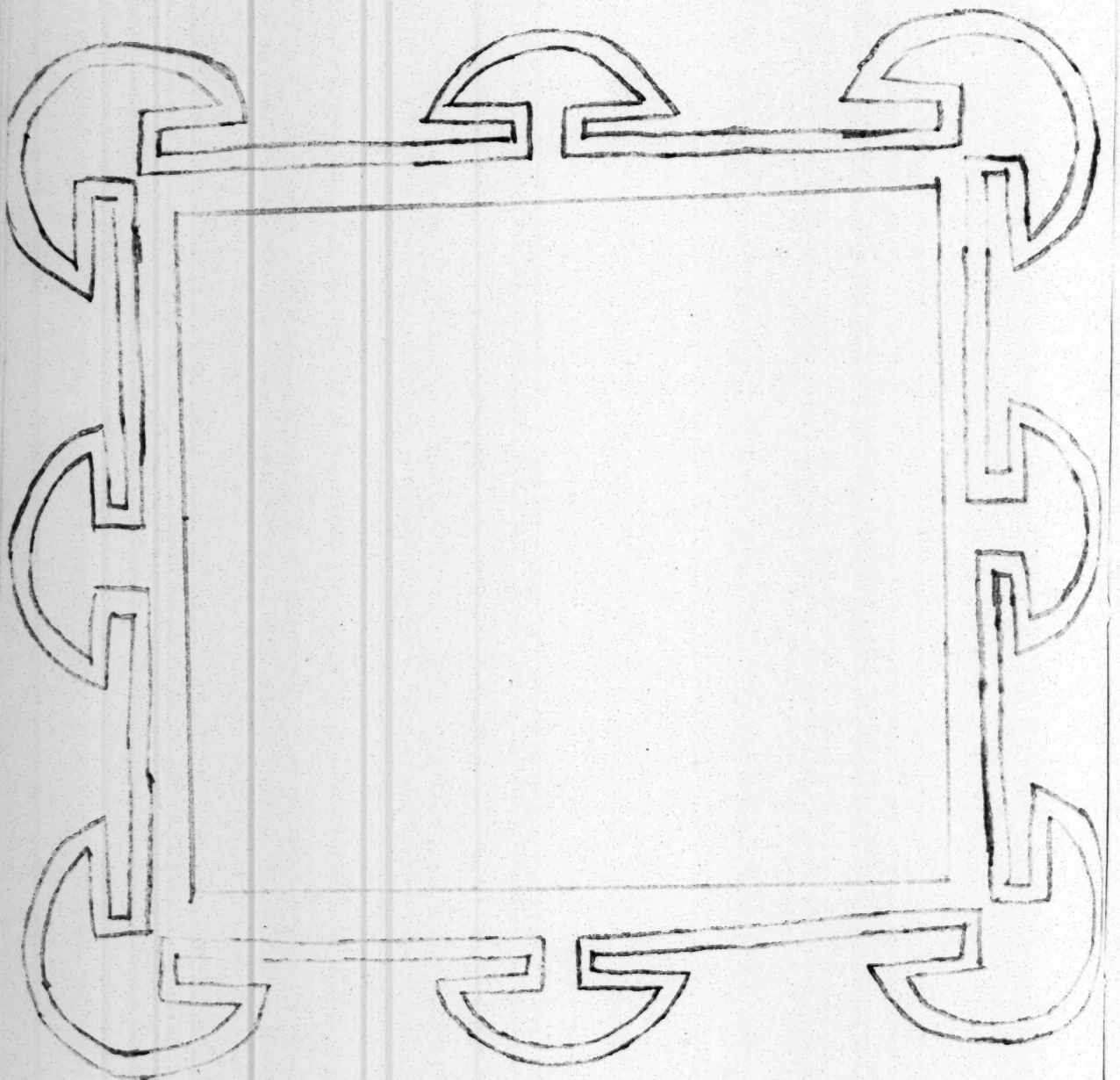


The proportion of a Campe, or Camps.

I Will onely at this time ſet downe ſome fewe particulars concerning Encamping; note that you ought not to be ruled by the ſcituation of any place, but let the ſcituation be ruled by you, by which meanes you may keepe alwayes one manner of Encamping, which is a great benefit, for thereby the Souldiers by that meanes will be almoſt able, their own ſelues to know where they muſt build their Hutts, eſpecially thoſe that are neere the Generalls lodging, and thoſe of the vtmoſt workes: note that where the ſcituation wanteth ſtrength, you muſt ſupply the ſame with Art and induſtry: take heede likewiſe that whereſoeuer you encampe, you foreſee that there bee roome enough to range your Bands according to your owne deſired Diſcipline. And becauſe it is wiſedome to deuide the Armed from the Vnarmed, I would therefore ſeperate the men that be combred with any thing from the vncombred. Therefore I would lodge all, or the greateſt part of the Armed men on the ſide towards the Eaſt, and vnarmed, and the combred on the Weſt ſide, making Eaſt the head, and Weſt the back part of the Campe, and South, and North, the flankes. The Artillery I would diſpoſe a long the bank of the Trench, and in the ſpace that ſhould remaine

towards

towards the West, I would lodge the impedement of the Campe, and note that forthwith with cords and staues you may ordaine euery man his lodging, especially if you make (as I said before) your Campe one way. A Generall should not so much seeke to place his Campe in seates strong by nature, as to fortifie them by Art, as well to keepe his Souldiers from idlenes (the only ruine of Armies) as also that due order in Camps may bee maintained: therefore immitate the ancient Romanes, the very Schoolemasters of the Art of Warre, who neuer coueted other then the plaine to Camp vpon, entrenching themselues nightly in as strong and sure manner, as if the Enemy had encamped by them, and that euen in places vtterly voyde of all suspition, to make these Millitary trauailes familiar vnto them, and to auoyde those idle, or rather dissolute effrenate pastimes, that our Christian Camps are still too much bewitched and sorted withall, to the vtter ruine of all good Millitarie Discipline, and confusion of our Armies. In setling of a Campe, besides the commodities of Wood, Water, and Forage, you must also consider how victualls may safely come, and leaue no Castles at your back to annoy you, but that you seeke to possesse them ere you march forward, for great is the annoyance that a little pile at the back of an Army may doe as well against Forragers, as to cut off Victualers from the Campe. And thus much for Encamping.

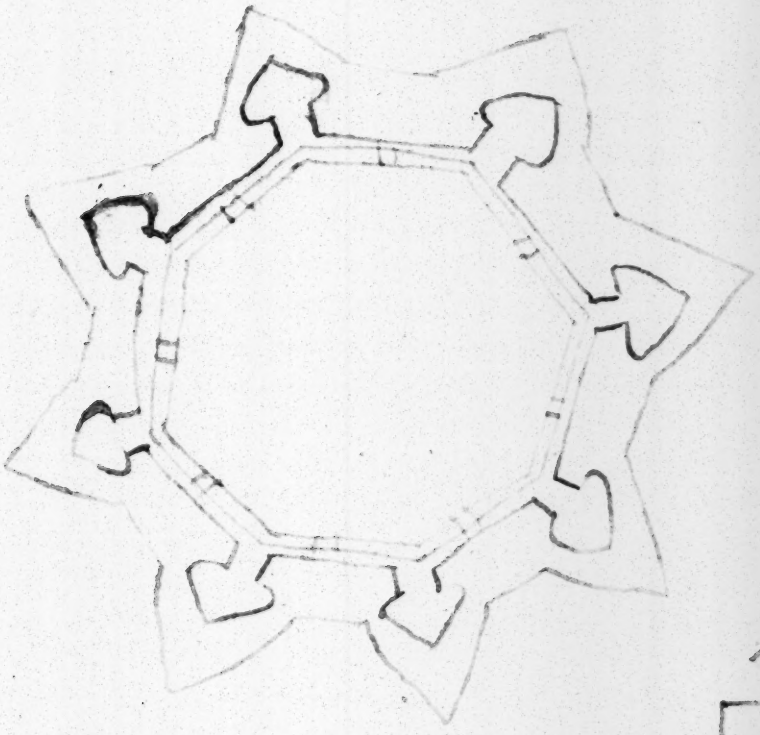


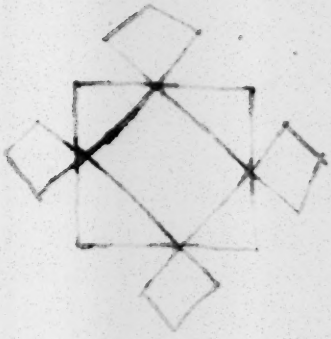
The ſtrongeſt and perfects faſhion *of all other for the building of a Curtaine or Wall of a Towne or Fort.*

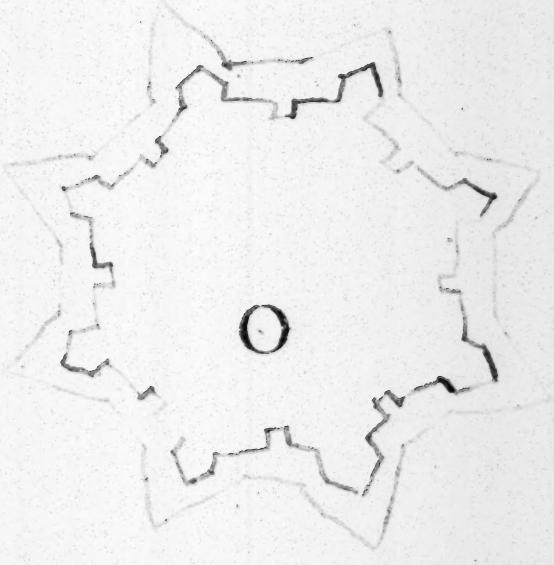
THE Circular faſhion is counted the beſt, ſo that the Curtaines or Walls bee made ſtraight, and of ſuch length, that of the Bulwarkes they may be flanked, which faſhion being made of many Corners, is moſt meete, if it be erected in a ſufficient place, otherwiſe not, for there it muſt be builded with fewe Corners, elſe the one Bulwarke will hurt the other: Therefore the farther that they bee made diſtant from the Bulwarke (the due length of the Curtaine being kept) ſo much the blunter the corners will come to bee, which by them muſt be defended, and the more of thoſe Corners that are there in the ſame faſhion, ſo much the blunter they ſhall alſo come to bee; likewiſe the more men they may haue to defend them, and more commodious ſpace within for to retire, with great and ſtrong fortifications, and the plot formes may bee made much further in, and haue the corners of their Bulwarks blunt, with a large backe, meete for defence, and in an aſſault much ſurer then the ſharpe, becauſe the ſharpe pointed Bulwarke being batterd, defendeth the Enemie from the platformes, ſo that vnder the ſame, being couered, hee may almoſt out

of

of danger make an assault, where against a Fortresse, after the fashion of these plots, following in whatsoeuer part of such places the Enemie should anproach marching towards them, to encampe, or in Battell ray to assault them, or with Trenches, and Artillery to batter them, either high or low, or by Curtaine within, or otherwise, he shall alwayes from many of those flankers of the same place, be greatly hurt and repulsed, and of the platformes, especially more then from any other where, because they bee most neere, and stand higher then any other, and they shall also hurt him more when hee shall bee somewhat farre off then neere hand, as may be seene by the plaine plot, that hath the number three; and so much concerning Fortifications for this time.







The manner that is vſed of La-ding *and blowing of great Ordnance.*

FOraſmuch as if the *Gunners* ſhould chance to be ſlaine, or otherwiſe lacking, to the intent that euery Souldier, in the time of neede, may know how to ſerue in their places, I haue thought good to ſhew ſometing of the manner of Lading Blowing off, and Diſparting of a Peece of Ordnance. Some doe take $\frac{2}{3}$ parts of Powder, ſome halfe, and others aboue $\frac{2}{3}$ parts; but that Peece muſt bee well fortified that may, or will ſafely blow out $\frac{2}{3}$ parts of Powder of the weight of the Bullet. After you know the quantity of Powder, you muſt put in the ſoule or concaue of the Peece the ſaid quantity, with the Ladle, and then when the Ladle comes to the Coyle, turne about your hand, and the Powder will be left behinde, then pull out the Ladle, and turne the other ende, and ramm it in ſoftly, then wadd it afterwards, and laſt put in your Bullet, and wadd him likewiſe. But note that before you doe any of theſe things, you get the diſpart of the Peece, which is no more to doe then to put a wyre into the touch-hole of the Peece, to the lower part of the concaue, then marke how high the wyre beares vpon the quoile, which marked, pull him out, and place him at the muſſell to the bottome of the Concaue there, and make your Diſpart

iuſt

iuſt as high as the notch was at the touch-hole: afterwards place the quoile and the toppe of the Diſpart in an euen line to the vppermoſt marke: Thus haue you the true *Horizontall* line, or line of Leuell; now for quicke diſpatch you may make cartreges of Paper, or Linnen baggs, and put a full Charge of Powder in them: So may you make a hole with a *Gunners* gimlett into the Cartrege, then prime with fine Corner powder, which is more readier to blowe him off: and when haſt requires, you may be the ſooner ready vpon any occaſion. Alſo Wine or Vineger are the beſt things to coole any Peece of Ordnance when they are hott.

Queſtions and Rules concerning Great Ordnance.

IF a Saker at Point blancke conuey her Bullet 300. paces, and at the beſt of her randome ſhoote 1500. what will that Cannon doe, which at point blanke ſhootes 360. paces.

Multiply 1500. by 360. and deuide it by 300. your queſtion is anſwered.

If a Saker of 4. Inches Diameter weigh 1600. pound weight, what will a Culuerin weigh of 6. Inches Diameter.

Multiply the Diameter Cubically, then ſay, if

64. giue 1600. what will 216. giue: Multiply 216. by 1600 your queſtion is reſolued.

If a Cannon at point blanke range 300 paces, and at the beſt of her Randome ſhoot 1500 paces, how farre ſhall ſhee ſhoot at the mount of one Degree.

Abate 300 from 1500, reſts 1200 which diuided by 45 the quotient is $26\frac{2}{3}$ ſo many paces ſhall ſhee ſhoot at euery degree.

If a Cannon of 10 foot long bee ſhot at a marke 700 yeards from the Peece, the diſpart being planting an inch wide, how farre ſhall the bullet light wide of the marke.

Looke how many times the length of the Cilender or Concaue of the Peece is to the marke, ſo many inches ſhall the Peece ſhoot amiſſe, being layd ouer or vnder one inche, if the winde be not to rough to alter it.

If you meaſure with a paire of Callaper Compaſſes the greateſt height of mettall, at the moſſell of the Peece, and likewiſe at the Coyle; abating the leſſer out of the greater, $\frac{1}{2}$ the remainder is the iuſt diſparture.

It is a general rule, that look how much a Peece is thicker of mettall in any one ſide at the quoyle then at the thickeſt part of the muſſell: as alſo, looke how many times the length of the Peece is to the Marke; ſo many times that ouerplus of thickeneſſe ſhall the bullet flye ouer the marke, being no higher then the Peece, and the Peece

blowne

blowne off without her disparture.

How to make Granados to shoote in a Peece of Ordnance.

THe Balles of mettall must be of the bignesse of the Peeces concaue, and a quarter of an Inch thicke, made three parts of Brasse, and one part of Tinne, but the Brasse ought to bee melted before the Tinn bee put to it; which Balles you must fill halfe full of fine powder, and the other halfe full of grosser powder mingled vvith Rosen vvell beaten: so that for three parts of grosse powder, there be one part of Rosen, and then putting in the holes some small Corne powder to make the rest fire, and after they be fired, and throwne, they will breake and flye into a thousand pieces, and both hurt and kill whomsoeuer are neere them.

How to find out the ſquare Root; of any number by this Table from 16 to 10000.

Number.	*Roote*	*Square*	*Remainder*
16	4	16	0
25	5	25	0
36	6	3	0
49	7	46	0
64	8	64	0
81	9	81	0
100	10	100	0
150	11	121	29
200	14	196	4
250	15	225	25
300	17	289	11
350	18	324	26
400	20	400	0
450	21	441	9
500	22	484	16
500	23	529	21
600	24	576	24
650	25	625	25
700	26	676	24
750	27	729	21
800	28	784	16
850	29	841	9
900	30	900	0
950	30	900	50
1000	31	961	39
1100.	32	1024	76

Number	Roote	Square	Remainder
1200	33	1156	11
1300	34	1225	44
1400	37	1369	74
1500	38	1444	31
1600	40	1680	56
1700	41	1681	0
1800	42	1764	19
1900	43	1849	36
2000	44	1936	64
2200	46	2116	84
2400	48	2304	96
2600	50	2500	100
2800	52	2704	96
3000	54	2916	84
3500	59	3481	19
4000	63	3969	31
4500	67	4489	11
5000	70	4900	110
5500	74	5476	24
6000	77	5929	71
6500	80	6400	100
7000	83	6889	111
7500	86	7396	104
8000	89	7921	79
8500	92	8464	36
9000	94	8836	164
9000	97	9409	21
10000	100	10000	0

And

And ſo you may proceede infinitely, but now the meanes to extract the roote of any number, is thus found: Suppoſe your number to be 200, firſt you muſt put a prick in euery odde place, beginning firſt on the right hand with the firſt, third, fift, and ſo continue vntill you come to the end of the number, except the laſt, which ſomtimes hath but one.

Secondly, marke the numbers that belong vnto the laſt prick towards the left hand: Or whether he haue belonging vnto him one number or two, looke the roote of that number if it be ſquare, and that roote ſet by a crooked line, as you place the quotient in deuiſion, and canſell all that ſquare number belonging to that prick.

But if the number belonging to that prick bee not a ſquare number, then take the roote of the greateſt ſquare, which is contained in it, and place the roote as I ſaid before, and the ſquare of it ſhall you abate from the number which belong to the laſt & prick, let the reſt be ſet ouer thoſe numbers cancelled, as you doe in deuiſion, and ſo haue you ended that prick, then in the ſame manner goe forward with the reſt. As for example 200, you place your prickes firſt on the cipher next your right hand, the next 2 the firſt figure, then I aske what is the roote of 2, and I finde 1, therefore I put that in my quotient, and ſubſtract it out of 2, and there remaines 1, then I double the quotient, and it is 2 that I place ſtill betweene the two pricks,

pricks, then I aske how many times 2 is in 10, and I finde 4 that I put also in my quotient, and substract it out of 10, then remaines 2, now I square the last figure 4, saying 4 times 4 is 16, which I substract also out of 20, the remainder is 4, which is the trueſt and ſpeedieſt way of all.

Here I will produce ſome queſtions of Arithmetick, which ſhall be to the purpoſe wee haue in hand, and alſo to ſhew and make manifeſt vnto you, how neceſſary it is for euery Souldier, whether he be Captaine, Lieutenant, or other Officer whatſoeuer that followes the Warres, to haue good skill in the depth of Arithmetick, as in the extraction of rootes, and alſo in the Rule of *Algebra*.

1 A Captaine Generall hauing three great Armies, would caſt them into three ſquare Battels, but he knoweth not how many men he ſhall ſet in the front of each Battell. The numbers of the three Armies are theſe: of the firſt there are 5625, the ſecond are 9216, the third 15129.

Now you muſt ſearch out the ſquare roote by the former rules, ſo ſhall you haue the anſwer.

2 A Prince hath an Army very great, with which he paſſeth in a valewe, ſo that in marching the Front can be but 18 men, and by that meanes the flanke containeth 249352. After that the Armie hath paſſed that valewe, the King minding to occupie all the beſt ground, willeth the Battell to be ſet ſquare.

You muſt multiply the flanke by the front, and then your number will be 8088336, and extract the roote, and you ſhall haue 2844 for your ſquare roote.

A Citie ſhould be ſcaled being double ditched, and the inner ditch 32 foote broad, and the wall 21 foote high: the Captaine commandeth skalling Ladders to be made of the iuſt height, that would reach from the vtter browe of the inner ditch, to the top of the wall, as in this figure is partly expreſſed.

As thus 32 multiplied in it ſelfe 1024, then 21 multiplied by it ſelfe maketh 441, now you muſt adde both theſe ſummes together, and there make 1465, then extract the roote which is $38\frac{12}{76}$, and that is the iuſt length of the line *A C*.

Note alſo this, that if at any time you haue occaſion to double any ſquare as a ſquare battaile, or a ſquare Campe: you muſt take the ſide of that ſquare, which you would double ſuppoſe that battell was before 210: now you haue as many more Souldiers as you had, therefore you muſt double it, the way to double either, the ground or men is thus, multiply 210 by it ſelfe, and thereof commeth 44100. that muſt I double 88200, the roote of which number extracted, is the double

and

and iuſt ſquare of that number which you had before 296. $\frac{284}{296}$.

And hereby you may perceiue the ouerſight of many men, which being required to double a ſquare plot, doe double the ſide of it, thinking it eaſily done.

But if they marke it well, he may perceiue that they doe make by that meanes a ſquare 4 times, as bigge as their firſt figure, was as by this figure any man may ſee.

A peece of Ordnance of 6 inches Diameter in the ſoule, doth carrie a Bullet of 20 pound waight, what waight ſhall that Bullet be, that ſerueth for a peece of Ordnance of 14 inches in the ſoule.

Note that all Globes beare together triple that propoſition, that their Diameters doe: So in this example, the proportion of their Diameters being as 14 to 6, or as 7 to 3, I muſt triple it, and then haue I the proportion of their Globes.

Wherfore I ſet the three fractions thus $\frac{222}{333}$, and there make $\frac{342}{37}$, that is 12 $\frac{18}{37}$, and ſo are the proportions of the Globes as well in weight as bigneſſe.

Therefore I muſt multiply 20, which is the waight of the leſſer Bullet, by the numerator of the proportion, and deuide it by the Denominator, and ſo ſhall I haue $254\frac{27}{27}$ for the weight of the greater Bullet.

There was a King with a great Armie, and his Aduerſarie corrupteth one of his Heraulds with gifts, and maketh him ſweare, that hee will tell him how many Dukes, Earles, and other Souldiers there are in that Armie: The Herauld loath to looſe thoſe gifts, and as loath to bee vntrue to his Prince, deuiſeth this anſwer which was true, but yet not ſo plaine, that the aduerſary could thereby vnderſtand that which hee deſired, and that anſwer was this.

Looke how many Dukes there are, and for each of them there are twice ſo many Earles, and vnder euery Earle there are foure times ſo many Souldiers as there bee Dukes in the field. And when the Maſter of the Souldiers was taken, the 200 part of them was 9 times ſo many as the number of the Dukes.

This is a true declaration of each number, quoth the Herauld, and I haue diſcharged my oath, now gueſſe how many of each ſort there was, marke the worke.

And firſt for the number of Dukes, I ſet 1 ☉ then will the number of Earles be 2 ☽, that is 1 ☉ by 1 ☽ multiplied twice, and the number of Souldiers

diers are 8 ☉ that is 2 ☽ multiplied by 1 ☽ foure times, but becauſe the 200 part of the Souldiers are nine times ſo many as the number of the Dukes, therefore muſt 200 part of 8 ☉ be equall to 9 ☽ and ſo conſequently 8 ☉ 1800 ☽ and 1 ☽ 225 ☉ or

For if I ſet $\frac{1}{200}$ and 9 as equall together, and would by the Art of Fractions bring the ſame proportion in whole numbers, I ſhall haue for 9. this Fraction $\frac{1800}{200}$ and ſeeing the Denominators be all one in $\frac{8}{200}$ and is $\frac{1600}{200}$ the proportion conſiſteth betweene the numerators.

Then to proceede if 225 be equall vnto one I ſhall take the roote out of the 225 for 1 and that is 15, which muſt be the number of the Dukes.

And ſo haue I the firſt number, wherefore the ſecond number which is the number of Earles, muſt be 15 times 15 twice, that is 450, and the number of Souldiers ſhall be foure times 15, multiplied by 450, that is 27000, and for iuſt triall of this worke, I take the 200 of the Souldiers that 1350, and I finde it to be nine times 15, that is nine times ſo many as the number of the Dukes, and ſo is the queſtion ended.

A Table to discouer numbers by hundreds, placed by 3. 5. 7. 9. and so forth to 15, as from 100 vnto 1500, as thus 7 in ranke, and 34 in File is 102.

Ranks men *Ranks men*

Admonitions for the Citizens of London *and* Briſtoll.

AND ſince I haue waded ſo farre into the Art *Millitary*, I haue thought good to aduertiſe thus much in generall; But perticularly, the Citizens of *London* and *Briſtoll*.

There are in theſe Cities ſundry Companies of three hundred apeece, which are to great by much to obſerue Rankes and Files, and diuers other Orders neceſſary and much vſefull, vnleſſe they are often vſed to be exerciſed by Deuiſions: Neuertheleſſe, it was abſolutely denyed by the auncient *Romanes*, who neuer deſired more then a hundred in one Company, and therefore they were called *Centurions*, as much to ſay as *Captaines* ouer Hundreds.

They who were the terrour of *Chriſtendome*, for feates of Armes, be our Preſidents; and let vs follow the imitation of the Mightieſt, rather then of others, whoſe populous aſſaults are ſcaled by the very eye of the Enemie, and repulſed by the diſorder of the Multitude. I will ſimilize this to the Husband man, who ſayes, one Acre well manured, yeeldes more profite then ten ill tillde; ſo one hundred well experienced, are able encounter with two hundred rawe Souldiers.

Some will (peraduenture) ſay, nay grumble at this

this my aduertiſement, becauſe they know it may be a greater charge vnto them then now it is, by reaſon of more Officers that muſt be vſed, if you leſſen your Companies, and not deminiſh your full Muſter.

To this I anſwere; The Cities Lands and Moneyes are infinite, and therefore able to vndergoe ſo ſmall a burden for the payment of more Officers, the ripeneſſe and expertneſſe in Millitary skill but lame, and extreme decreped: Adde the aſſiſtance of Money to the decrepidneſſe of Diſcipline, and you ſhall be ſure to haue a meane of both ſides, the ſtrength of the City will be thereby much the more inabled, the Honor of it the moe renowned, and the furie the more feared: For what a terror will it ſtrike into the hearts of Strangers, and an amazement to our neighbouring Kingdomes, to ſee euery Man ſo skilfull and compleate, Marching, Trouping, and Standing in Battell-ray, like ſo many Commaunders, the worſt not vnworthy the gouernement of a Noble Company, daring *Bellona* and her fierceſt aſſaults, ready to encounter the worſt of Stratagems?

Now Noble Citizens, the Honor will be your owne, the Strength the Kings, and the Wonder the Worldes, which I hope will be no long time deferred, to the glory of God, the defence of true Chriſtian Religion, and to the generall preſeruation of your ſelues.

Alſo,

Alſo, there is an other matter, which is not ſo ſeemely and Souldierlike performed as I haue ſeene it in Forregine parts: That is, your Marching into the Field, for you obſerue no manner of Order; therefore marke this: Let euery priuate Captaine repaire, to and attend his Colonells Enſigne, and ſo let the Eldeſt Colonell march firſt into the Field, then his Captaines, according to their antiquity: And in comming out, or Trouping in, firſt the Youngeſt, then the next, by which meanes, you ſhall be able and ready to ioyne Battle, without the trauerſe vp and downe of ſo much ground, before you know your right range; for you ſpend a great part of the day in placing your Companies right in their order.

Theſe things amended, and orderly performed, will adde much Honour to your Cities, and commendations to the Leaders and Officers: and ſo I reſt.

The Authors Farewell to his faythfull Friends: Or, his Caueats to his louing Countrey-men.

IT is bad Pollicy to let Danger knock at the Doore. Solid and grounded Courſes which keepe dangers aloofe, are better then fine ſhiffts, and neate deliuerances, when they are neere.

Meditation without Practiſe, is like an vnſtringed Inſtrument, whereon no Man plaies: Practiſe without the Theoricke, is like a ſtringed Inſtrument, but not well Tunde.

It is a Maxime in Millitary proceedings, that thoſe things determined, ſhould not be communicated, but to thoſe without whome it can not be effected.

Beware of too long Conſultations, leaſt they flye away with the time: Delayes and protractions prooue dangerous many times fruſtrary.

An Army of Sagges led by a Lyon, is better then an Army of Lyons led by a Stagge.

In Warre, nothing can be worſe, then to ſay, *Had I Wiſt.*

A Generall told his excuſing Souldier, *Thou muſt not fayle twice in Warre.*

The wiſeſt Captaines, needes not thinke it a derogation to their Valour, or a deminution to their Honor, to rely on Counſell.

Youth

Youth are like the first cogitations, not so wise as the second, fitter to Inuent then to Iudge; fitter for Execution then for Counsell; fitter for new Proiects then for setled Businesse. They in conduct and managing of Martiall affayres, imbrace more then they can hold, fire more then they can quench, stirre more then they can quiet, flye to the end, without consideration of the meanes.

Old men obect too much, consult too long, aduenture too little, seldome driues businesse home to the full: Therefore a mixture must be vsed: Ages Wisedome, and experimentall aduise, ioynd with Youths Valour, and quick dispatch, prooues inuincible.

A Poſtſcript to the Reader.

COurteous Reader, *I had thought to impoſed ſilence to my Penne, and to haue infuſed a Period to this my* Compendium; *But I did thinke fitte to adde theſe few Lines, as a ſupplement & Poſtſcript, to ſhow the cauſe of this my writing.* The Cauſa mouens, *or,* Primum mobile *of it, is a declaratory Inſtruction to my Countrey-men in generall, but eſpecially to Noble, (though vnexperienced* Tyrones*) in whom, there is either an inbred, or an aduenticious deſire of* Millitary Diſcipline, *or to exoſitate, or ſtir vp thoſe that are vnexperienced, to a further proſecution of theſe generous & well beſeeming Qualities.* The Terminus ad quem, *or, the intentiall ſcope and drift of this, is for the beneficiall good of my Natiue Countrey. From the*

firſt

first of these, I doe desire their courteous welwishings; from the second, their gratefull acceptation; from the third, their louing approbation: As for the last, though I owe more then I am able, yet when I am able, I will showe more; In the meane time, take this as a depositum.

FINIS.